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President's Address.

THE MEDICAL PROFESSION OF AUSTRALIA AND THE WAR.

By D. M. McWhae, C.M.G., C.B.E., V.D., M.D., F.R.C.P., F.R.A.C.P.,
Perth.

It is my privilege on behalf of the congress to express our loyalty to His Majesty the King and our gratitude to the armed forces of the British Commonwealth and of our Allies for achieving victory and making the congress possible.

We are very grateful to His Excellency the Lieutenant-Governor of Western Australia for opening the congress and to the Honourable the Premier of the State for welcoming our visitors. We Western Australian members also extend the warmest welcome to our colleagues from the eastern States and especially to those from overseas.

It gives me great pleasure to acknowledge the unvarying support and cooperation we have received from the Government of Western Australia, from the University of Western Australia, from the Lord Mayor and Councillors of the City of Perth, and from every organization and person we have asked for assistance.

I am very conscious of the greatness of the honour that has been conferred on me by my being elected president of the congress, and I am deeply and sincerely grateful.

Some six years ago a large number of medical men met in one of our public schools in the first of a series of clinical meetings. Guildford Grammar School had been taken over by a United States Army medical unit and converted into a hospital for American soldiers who were to have come here, but were never needed, because help in what then appeared to be a time of great peril to Western Australia came from the eastern States. Troops poured into Western Australia with their medical units, and it was the medical officers of these units—men from all parts of Australia—who attended the meeting in the Guildford Grammar School, where the Western Australians present were relatively very few. Large numbers of our colleagues from the east spent a long time in Western Australia, and

a friendship and comradeship developed between us, such as can occur only from the close association and common objectives of war.

It is therefore very right and proper that this congress should be held in the State that owes so much to the rest of Australia, and might even have owed its very existence. We are glad indeed to have this opportunity of showing our gratitude and of renewing old friendships.

THE MEDICAL PROFESSION OF AUSTRALIA AND THE WAR.

The subject of my address is "The Medical Profession of Australia and the War". I shall narrate, necessarily very briefly, how the profession acquitted itself during the greatest and most prolonged trial it has ever been submitted to; but I am making no attempt to discuss the great achievements of the profession in Great Britain, New Zealand or elsewhere. I shall describe first the coordination of the profession, then the medical services of our armed forces, and finally the work of the profession in Australia. I wish to thank Major-General S. R. Burston for the great help he has given me in preparing the address.

I desire to pay a tribute to the high quality of the leadership of the directors-general of the medical services: to Major-General Burston, who was head of the Medical Services of the Australian Imperial Force, and also of the Army from April, 1942, until the end of 1947; to Surgeon Rear-Admiral W. J. Carr; to Air Vice-Marshal T. E. V. Hurley; to Dr. J. H. L. Cumpston, Commonwealth Director-General of Health; to Major-General R. M. Downes, who was Director-General of Medical Services of the Army prior to and during the early years of the war, and who was killed in an aeroplane crash; and also to Major-General F. A. Maguire, who was Director-General of Medical Services of the Army during the intense activity that followed the Japanese entry into the war. This list would be incomplete without the name of Major-General G. W. Barber, who was Director-General of Medical Services of both Army and Air Force for many years between the two wars, and whose enthusiastic leadership and administrative ability played the chief part in laying the sound foundation for the organization and training of the army medical services, which enabled them to function so rapidly and efficiently in the recent war.

The Coordination of the Profession.

The Central Medical Coordination Committee, with a Medical Coordination Committee in each State, was responsible for the allotment of the profession to the services and to civil practice. At first the medical manpower position presented no difficulties; but after Japan came into the war and general mobilization was ordered, the medical requirements of the services became very large, and it was necessary to assume control of the profession to secure equitable provision for the needs of the services and the civil population. No other section of the community was conscripted to the extent of the medical profession. All medical personnel, medical practitioners up to the age of sixty years, and the youngest medical student, were at the disposal of the Government, and could be called up for whole-time duty anywhere in Australia; and not only this, no medical practitioner engaged in private practice was permitted to move from his practice without the permission of the State Medical Coordination Committee. The profession accepted these severe restrictions gladly and cooperated to the fullest degree.

The Emergency Civil Medical Practitioner Service was formed in March, 1942, to prevent any region from being left without necessary medical attention, and to provide for medical service in the event of enemy raids. One-third of the doctors of Australia enlisted in the armed forces, and two-thirds remained in civil practice, and of the latter 80% enrolled in the Emergency Medical Service.

I cannot do better than quote Dr. Cumpston's farewell words on his retirement on May 31, 1945:

It has been a time of difficulties and of continual presentation of new problems, but this record of six years, during which all problems of medical coordination have been adequately met, is one of which all who took

part in it may be proud. I know quite well that this could not have been done by legal or administrative direction alone; and all the success that has been achieved is due to the very willing cooperation of the whole medical profession, and the wise and sympathetic direction of the State committees.

The Medical Services of the Armed Forces.

The Navy.

The total number of medical officers in the Royal Australian Navy during the war was about 150, and the number serving at any given time never rose above 105; of these seven were killed in action or reported missing, and nineteen were awarded decorations or mentioned in dispatches.

Among the ships that were sunk was His Majesty's Australian Ship *Perth*, which had many associations with our city. She sailed from Fremantle on February 13, 1942, and fought for sixty hours in the Battle of the Java Sea with the Dutch Navy, and then returned to Batavia to refuel. Next day—February 28—the American cruiser *Houston*, and *Perth*, when trying to go through the Straits of Sunda, met the Japanese fleet at 11.30 p.m. They fought at point blank range. *Perth*, struck by many shells and a number of torpedoes, sank in half an hour, firing the last of her ammunition as she went down, and *Houston* sank soon after. In *Perth's* gallant crew were two medical officers. The senior, the son of one of Western Australia's oldest medical practitioners, was lost with the ship, and the junior, a young New South Wales doctor who had previously been torpedoed on the destroyer *Waterhen* in the Mediterranean near Tobruk, again survived.

The Army and the Air Force.

The Australian Army Medical Corps in 1939 consisted of a handful of enthusiastic Militia medical officers and the few hundred other ranks they had trained. By 1943-1944 it had grown to a strength of 32,000 all ranks (8% of the total strength of the Australian Military Forces), made up of 2500 doctors, 3500 nurses and 900 non-medical officers employed as scientists, as technicians and on general duty, and over 25,300 other ranks.

This service provided 35,000 hospital beds in Australia and in the operational areas, as well as the normal field medical establishments of the Army—namely, casualty clearing stations, field ambulances and regimental medical establishments. If casualty clearing stations and convalescent depots are included, an additional 13,000 beds must be added. It also provided special units, such as malaria control units, field entomological units, mobile bacteriological laboratories, surgical teams, blood transfusion and resuscitation teams and the Army Research Unit at Cairns, that did so much to solve the problem of keeping an army in the field in highly malarious areas.

In spite of this rapid growth and the difficulties that were encountered owing to the exacting conditions of terrain and climate, this very large and complex service worked with smooth efficiency throughout the war, and provided a standard of care and treatment of the sick and wounded, even in the general hospitals in the most forward operational areas, that was equal to that in our best civil hospitals.

High though the standard of the care of the wounded was, it was a war in which the physician, the scientist and those concerned with hygiene and the prevention of disease had the most difficult and vital problems to grapple with. It is true to say that never in any army in any war has ultimate victory been so dependent on the medical services' rising to the occasion and providing the answer to what appeared the insuperable problems of the epidemic and endemic diseases of the areas in which it was compelled to fight.

The functions of the army medical service are twofold: first, to collect, evacuate and treat the sick and wounded, and second, to advise on all measures necessary for the maintenance of health and the prevention of disease. The latter function is of equal importance to the first, if not of greater importance; yet in thinking of war our minds turn first to the casualties of battle.

The evacuation of casualties in the field was entirely different in the jungles of the Pacific islands from that in the deserts of the Middle East. Thus, in the jungles, surgical teams were frequently operating as far forward as the advanced dressing stations, and in some cases were working within rifle range of the Japanese. This was necessary as a life-saving measure, because frequently it was impossible to transport a seriously wounded man any further than the advanced dressing station without grave danger to his life. The outstanding feature of the work of the field medical units was the initiative they displayed in rising to every occasion; in spite of the great difficulties encountered they were able to give to every wounded man the best chance of survival.

Air transport was used on a large scale for the sick and wounded. The first air ambulance unit used in the Middle East was a Royal Australian Air Force unit, which conveyed several thousands of casualties in Libya and Tunis, and after the return of the Australian Imperial Force to Australia it continued its work with the Eighth Army in Sicily and Italy.

In New Guinea until March, 1944, the air transport of our casualties was carried out by the United States Army Air Force. Ordinary transport planes were used, without any special fittings for patients. It was not possible to know when the planes would arrive, and they could wait only a short time on account of the risk of bombing; they had to make as many trips as possible during daylight. It was therefore necessary to have the casualties ready for evacuation at all times. If planes were held up for a few days, as many as 500 sick and wounded would have to be fed and cared for while awaiting evacuation. Although the system was somewhat haphazard, the field ambulances, as always, rose to the occasion, and it worked. I do not know how many of our casualties were transported by the American air force, but the number must have been very large.

The Royal Australian Air Force took over in March, 1944, and the organization was placed on a sound basis, because liaison between the army and the air force was good, and because the air force supplied the medical personnel and equipment for care and treatment of patients during flight. Two air ambulance units with specially fitted and equipped planes were provided, which were used solely for medical purposes and flew under the Red Cross. Also, ordinary transport planes, with special fittings which could be easily set up and when not in use folded out of the way, were used for casualties on their return journey. Our air force transported 14,000 sick and wounded and covered 2,000,000 air miles in doing so.

In the South-West Pacific Area large numbers of troops were frequently landed from ships in enemy occupied areas, and a very high standard of training and organization was necessary for the medical units taking part in such operations.

Medical personnel and equipment were allotted to vessels so that they fitted in with the tactical plan. Facilities for major surgery had to be provided on transports, as hospital ships did not accompany the convoy, because they had to be brilliantly lighted at night in accordance with the Geneva Convention, while strict blackout conditions were required both on the convoy and on the beach.

The personnel of the regimental aid posts and beach dressing stations and a surgical team landed with the assault troops, carrying all their equipment with them, special packs holding sixty pounds being provided, the packs being easily unfastened should the bearers become wounded. As the water through which they waded might be up to their necks, all perishable medical stores had to be kept waterproof.

The regimental aid posts and beach dressing stations were rapidly opened, and the surgical team could function within two hours of landing; but conditions were very crude—nothing but a canopy overhead, although autoclaves were ready and instruments were sterilized. It was better, therefore, wherever possible, to do early major surgery on the transports, where conditions were so much better. In quick succession followed a field ambulance and a casualty

clearing station, and then full medical and surgical treatment were available on shore.

To meet the special conditions of such operations the air force developed small mobile field hospitals, which were completely transportable by air. These hospitals, with their own X-ray units and laboratories, were self-contained. They could be set up in working order within two or three hours of arrival, and could handle any medical or surgical casualties met with. They could accommodate 50 patients, and in an emergency could be extended to 100.

The results of treatment of the wounded in this war were good, the mortality rate being about half that of the first world war. This great improvement was partly due to the use of sulphonamides, and later of penicillin, both of which had a remarkable effect in controlling wound infection. Also, transfusion of blood was available right up to the front line. Each soldier had his blood group stamped on his identity disk, and blood flown from Sydney or Brisbane reached the forward area in New Guinea in three days. A tribute should be paid to the Australian Red Cross Society for taking over the whole responsibility for the collection of blood and the production of serum in Australia. Other important factors contributing to the reduced mortality rate were the forward placing of surgical teams, and the great development of the transport of casualties by air.

Prevention and Treatment of Disease.

In the history of warfare, sickness casualties have always far outnumbered casualties due to enemy action, and campaigns have even been abandoned on account of epidemic disease. In this war our soldiers were exposed to the risks of infection by tropical diseases, against which they have no natural resistance, because such diseases are practically non-existent in Australia. The control of disease during tropical warfare therefore was not easy.

Dysentery is a disease which occurs whenever large numbers of people are collected together under conditions in which high standards of hygiene cannot be maintained, and it has often decided campaigns throughout the ages.

The new drug, sulphaguanidine, has proved of the greatest value in the treatment of dysentery. Soon after the arrival of the Australian Imperial Force in the Middle East in 1940, a small quantity of the drug was synthesized there, but only sufficient to test on a few selected patients. The results were so encouraging that 1000 pounds of the drug were obtained by air from the United States. This was divided equally with the British, and was reserved for serious cases only. The results of treatment were so dramatic, that the Director of Medical Services, Australian Imperial Force, advised the Director-General of Medical Services that it should be manufactured in Australia as soon as possible.

The most important incident in connexion with the drug occurred in August, 1942, when the Japanese were within 25 miles of Moresby. Nearly 2000 of our comparatively small force were in hospital with dysentery, and in the forward areas nearly every man was suffering from diarrhoea, which on investigation proved to be Flexner dysentery. The situation was critical, as the force was rapidly melting away from this cause, and if the disease could not be checked, there would be a grave danger of losing Moresby, and what this would have meant to Australia may be left to the imagination.

Sulphaguanidine was not to be in production in Australia until November, but there was still the remainder of the 500 pounds that had been obtained in the Middle East. With the concurrence of the Commander-in-Chief, General Sir Thomas Blamey, the whole of it was flown to Moresby, and arrived in forty-eight hours. It was immediately sent up to the regimental medical officers with the troops in contact with the Japanese, and a full course of treatment was given to every man in the force suffering from diarrhoea. Within ten days the epidemic had disappeared, and the Commander-in-Chief himself agreed that had the epidemic not been checked it would have had a most serious effect on the operation, as every possible fit man was needed to stem and turn the Japanese advance.

The combination of efficient hygiene and this new treatment, which was pioneered by the Australian Army Medical Corps, resulted in dysentery being no longer a major problem as a casualty producer. The mortality rate was also greatly reduced, being 0.05 per thousand as against 3.5 per hundred in the first world war; by the end of 1945 the total number of deaths from dysentery in the military forces was under double figures.

Important though the control of dysentery was, that of malaria was infinitely more so. In fact, it is safe to say that, had the answer to this problem not been provided, it would not have been possible to keep an army in the field in the highly malarious areas of the South-West Pacific; and Earl Mountbatten, while in Australia, stated publicly that the measures laid down by Army Headquarters in Australia to combat malaria were the biggest factor in the success of the campaign in South-East Asia. He issued our General Routine Order as a South-East Asia Command Order practically *verbatim*, with only the necessary geographical alterations.

It is not generally known what an important part Brigadier N. Hamilton Fairley, who commanded the Army Research Unit at Cairns, played in antimalarial research. He is recognized throughout the allied world as the man who, more than anyone in any medical service, made the whole campaign in the tropics possible. His results could not have been obtained without the loyal support of a zealous band of medical officers, and without the devotion of the men who offered themselves as experimental patients. The names of Colonel E. V. Keogh, Colonel E. Foord, Lieutenant-Colonel J. C. English, Lieutenant-Colonel C. E. Cook and Lieutenant-Colonel I. M. Mackerras will always be associated with the field work, and those of Colonel Ian Wood, Lieutenant-Colonel R. R. Andrew and Lieutenant-Colonel C. R. B. Blackburn with the laboratory work.

During the three years of its existence the Army Research Unit investigated thoroughly the suppression and treatment of malaria. The drugs studied included quinine, "Atebrin", "Plasmoquine", "Paludrine" and sulphadiazine. It was necessary to find a substitute for quinine, as 95% of the world's supply of that drug came from Java.

Eight hundred and fifty volunteers were infected with malaria, some receiving as many as 120 to 130 infective mosquito bites, and they were subjected to severe stresses and strains, such as long marches under tropical conditions, being chilled in freezing chambers and injections of adrenaline and insulin. Many hundreds of troops with relapsing malaria were also kept under observation and treatment.

"Atebrin" was thought to be a dangerous drug. The research unit therefore proceeded at first very cautiously, but proved that it was not only safe, but a far better suppressant than quinine. It was also shown to produce a radical cure in volunteers infected with malignant tertian malaria. It was found that if troops took "Atebrin" in adequate daily dosage, it was possible for them to go into hyperendemic malarious areas without significant malaria casualties, and that blackwater fever and deaths due to malignant tertian malaria would not occur.

The first warning of the magnitude of the menace from malaria occurred during the operations at Milne Bay. This was known to be an extremely dangerous endemic malarious area, and comprehensive instructions were issued by the Commander-in-Chief in regard to malaria control. But antimalarial discipline was slack from the start, and antimalarial stores were left at Townsville, because other supplies were considered to have a higher priority. The inevitable occurred, and within a few weeks of the Japanese landing malaria broke out with ever-increasing severity.

During the fighting on the Kokoda Trail there was little malaria, but when the troops reached the marshy country on the other side of the mountains, malaria struck with all its virulence.

In December, 1942, and January, 1943, evacuation from New Guinea reached its peak, and an average of 1000 men per week were evacuated for six consecutive weeks.

No army could have stood this strain on its manpower. The Commander-in-Chief quickly appreciated the position. Evacuation of malaria patients from New Guinea was forbidden, and malaria control was given first priority. At Milne Bay there was a dramatic fall in the malaria rate, which was reduced from 82 per 1000 per week on December 26 to 10 per 1000 three weeks later, and then to a maintenance incidence of about 5 per 1000. This was done by malaria control alone, as suppressive treatment at that time was very inadequate. This success was very important, because it demonstrated what the medical service could do, and it proved to be the turning point in an almost heart-breaking battle against uninformed prejudice.

But even as late as the Markham Valley and Ramu operations in 1943-1944 the malaria rate was disappointingly high, and it was not until the Cairns investigations had placed the use of "Atebrin" on a scientific basis that all senior commanders cooperated wholeheartedly and instituted the strict antimalarial discipline that was essential to ensure success.

In Borneo the dangers from tropical diseases appeared to be even greater than in New Guinea. There was a dense native population, and although these people appeared to be in good health, they had all suffered from tropical infections and had acquired an immunity; but they were a menace to the health of any new arrivals in their country. A further difficulty was that the Japanese were all heavily infected; and another was due to the displacement of large numbers of native inhabitants from their homes, which forced them to live without any sanitary precautions whatsoever.

However, the Australian Imperial Force had a whole year on the Atherton Tableland to prepare for the Borneo operations, and the medical service took full advantage of it. The Assistant Director of Hygiene on Corps Headquarters, and the Deputy Assistant Directors on Divisional Headquarters, were experts in tropical medicine. The Assistant Director compiled a booklet containing essential information on tropical diseases and hygiene, and a concerted effort was made to impart this to everybody in the Australian Imperial Force, from general officers downwards.

Thus the force entered the disease-ridden areas of Borneo with a very thorough knowledge of how to avoid infection, and the results were most satisfactory, a high standard of health with a low sick wastage being maintained throughout the whole Borneo campaign.

With regard to the treatment of malaria, the standard quinine, "Atebrin" and "Plasmoquine" treatment was laid down for the Australian Imperial Force by Fairley in 1940, and was adopted by both the British and the American forces. It was much superior to any previous method of treatment, the mortality rate from malaria being 1 in 3000 compared with 15 to 45 per 3000 in the first world war. This was a splendid result, when it is remembered that it was obtained in a country where malignant tertian malaria was rampant.

Although the standard treatment rapidly terminated acute attacks of malaria, relapses were frequent, and in August, 1946, the "Plasmoquine"-*"Paludrine"* treatment—also devised by Fairley—was introduced. This had a great effect in lessening the number of relapses. The average number of admissions into Hollywood Hospital was reduced at once from 265 per month to 58 per month, and these figures speak for themselves.

The discovery of "Paludrine" was a triumph for British research. It was synthesized in England in 1944 after brilliant work by Curd, Davey and Rose, and it was investigated in a masterly fashion by the Army Research Unit at Cairns. Speaking of this drug before the Royal Society of Tropical Medicine in June, 1946, Fairley stated that its outstanding quality was the smallness of the dose required to resolve a clinical attack of malaria; that no other drug was so effective in the radical cure of malignant tertian malaria, and that it had extraordinary potency as a malaria prophylactic; further, that it was a very safe drug on account of the remarkable latitude between the optimal therapeutic dose and the toxic dose.

These researches were not to bear fruit until "Paludrine" became available in quantity after the war. A survey carried out in 1946 by the Repatriation Commission showed that it was the most successful antimalarial agent yet devised; although it was not an absolute cure, relapses occurred in only 1.3% of cases covered by the survey. The drug has been adopted by the commission as an alternative treatment for the acute stage, and as the only treatment for the six months' suppressive follow-up treatment.

The greatest achievement of the medical service in caring for the sick was its work on the Burma-Siam railway—the greatest, because the doctors were as starved, as emaciated and as ill as their patients, and were subjected to the same beatings and humiliations. Sixty-two thousand soldiers worked on this railway, and 15,000 died. If it had not been for their British and Australian medical officers, who proved not only great doctors but trusted leaders, few would have survived.

Surgical operations, many of them difficult and complicated, were performed in the Burmese jungle camps with the crudest of improvised instruments. From the medical aspect, as typical of the work of our colleagues, I shall refer only to the cholera epidemic in the middle of 1943, by quoting the words of Frank Foster in his book "Comrades in Bondage".

Positive and suspect cases were isolated in remote parts of the jungle. Bodies of the men who died were cremated on a pyre of bamboo, together with their personal belongings, and their ashes were buried in our well-kept cemetery. Saline was injected into the veins of the patients to make up for the wastage caused by the violent emission of cholera fluids. When it became impossible to provide rubber tubing, Ernest Dunlop took the rubber from his own stethoscope. The only water was from a filthy stream. This had to be heated and condensed before it was fit to transmit to the human frame. Day and night the fires of the condensing plant on the river bank were stoked, while Colonel Dunlop and Major Corlette battled to save life in the candle-lit tents of the jungle. Out of 130 patients one-third died, most of those who died being hopeless from the start.

Time does not permit me to say any more of the work of our colleagues on that railway, but I hope that their deeds will be told in the medical schools, so that they may be an inspiration to all who enter our profession in future.

The army medical service was the first to prove the value of dimethyl phthalate as a mosquito repellent, and later of dibutyl phthalate as a mite repellent. The latter reduced the incidence of scrub typhus to a very low figure. Scrub typhus is a serious disease with an average mortality rate of 8%, caused by the bites of small red mites, just visible to the naked eye, which crawl over the bodies and clothing. Major R. N. McCulloch showed as early as 1943 that if dibutyl phthalate was rubbed into the clothing by hand, it would give complete protection to volunteers spending many hours of the day in the mite-infested jungles of New Guinea. Both these repellents were adopted by the British and the Americans.

The army medical service was solely responsible for the quarantine arrangements for preventing such diseases as malaria from becoming endemic in Australia. The only real outbreak occurred in Cairns, where malaria has always been mildly endemic, and it is quite possible that the outbreak was not caused by infection brought in from outside. It was dealt with by the army medical service. Blood smears were taken from the whole civil population, and all those found to be infected were treated. Comprehensive measures were also taken against mosquito breeding, with the result that now Cairns is considerably better off in this respect than before the war.

The Profession in Australia.

The first task of the Australian Army Medical Corps in Australia was to make up for what it had lost to the Australian Imperial Force. Before the Japanese came into the war, the training of officers and non-commissioned officers was carried out on a large scale, so that when general mobilization was ordered it proved possible to

bring the new medical units to a state of efficiency in a surprisingly short time.

A brief description of a medical tactical exercise, similar to many that were held in Australia, will probably give the best idea of how the corps trained for war, and will also draw attention to the medical arrangements required for "open" warfare in contrast with those to which I have already briefly referred. The exercise was conducted by a New South Wales division from December 11 to 14, 1942, in a northern area of Western Australia, where enemy landings were supposed to have occurred on a forty-mile front. Five hundred and fifty casualties were provided. They were evacuated from regimental aid posts by the field ambulances to the main dressing stations, and thence by motor ambulance convoy to the casualty clearing station some 35 miles from the coast in the rear of the division. For three days and nights the battle went on, the field ambulances being trained in mobile warfare. The motor ambulances of the motor ambulance convoy travelled over 12,000 miles without a mechanical breakdown. When the casualties arrived at the casualty clearing station, a schedule of one hour was allowed for major operations and half an hour for minor operations. The evacuation was carried out without any hitch, the casualties being efficiently dealt with at every stage of the exercise.

The Volunteer Defence Corps, better known as the "V.D.C.", and the equivalent of the British Home Guard, also played an essential part in the defence plan, and in a vast and sparsely populated State like Western Australia it was of great importance. I can speak only of the medical arrangements made for it in this State. In June, 1941, General Barber accepted the post of Chief Medical Officer. He had no difficulty in obtaining a number of honorary medical officers from general practitioners who resided in the battalion zones, who knew the country and the roads, and who were therefore in a position to cope with any emergency. He organized mobile medical units. Some battalions, owing to the great size of their areas, had two or more medical units. Their functions were to act as a regimental medical service and to establish small dressing stations. Training was carried out by medical officers and sergeants, many of whom had been members of the first Australian Imperial Force. Equipment was obtained, some from the army, but most was improvised or manufactured locally. Both medical officers and other ranks were keen and enthusiastic, and a high standard of efficiency was attained.

Civil Medical Practice.

Owing to the great depletion in the number of civil medical practitioners, burdens were placed upon those that remained, which were gladly borne. The physicians in this city were reduced from eight to two, and one of these was the executive officer of the Medical Coordination Committee. The surgeons were reduced almost to the same extent; all, whether specialists or general practitioners, worked to the limit, and in the cities they shouldered the responsibility for the medical arrangements for possible air raids.

I could give many examples of devotion to duty, but one will suffice. There is a seaport town in Western Australia where there are now four medical practitioners. During the war this number was reduced to one, and the coordination committee called upon a doctor who practised in a country town some thirty miles distant to assist. It was sixteen months before further help could be obtained, and during this period the doctor drove 66 miles a day on five days a week, and occasionally had to make two trips on the same day; the total distance covered must have been at least 25,000 miles, and a busy medical practice had to be carried on as well. This was done by a woman who is now in her seventieth year.

Many of the younger men enlisted in the services, but could not be spared from civil practice; the service directors, while expressing the greatest sympathy for them, could not agree, except in isolated instances, to their exchange with serving medical officers.

Civil medical practice today has been greatly influenced by the war. Young physicians and surgeons, who had

shown outstanding ability during their medical course and term of hospital residence, were, after a period with field medical units, moved to general hospitals, and if favourably reported on there, were posted to base hospitals and given an opportunity of obtaining a higher degree. They were then eligible for appointment as junior specialists in a general hospital or a casualty clearing station, with the rank of major. By this means a large number of well-qualified physicians and surgeons were available to the civil community after the war.

Some younger medical officers were also given specialist training, partly to assist in the specialist services of the army, and partly to enable those who had been prevented by war service from doing post-graduate work, to receive at least preparatory training in a specialty. This policy has also been of help in civil practice.

Some medical officers were sent to England for training in plastic and facio-maxillary surgery, and their work on returning, in teaching a number of younger surgeons and dentists, has been of great value to the services and to the civil community; this also applies to the orthopaedic surgeons who were sent to England and to the United States in 1944-1945 to become *au fait* with the latest work in these countries.

Moreover, with the whole-hearted cooperation of the Director-General of Health, two scientists were sent to the United States to learn the technique of the production of penicillin, and as a result of this, Australia was the first country in the world to produce enough penicillin to satisfy the needs of both the services and the civil population. This was done by June, 1944.

Reference should also be made to DDT. This was a German drug originally designed for entomology, and the discovery by Swiss, British and American scientists of its insecticidal action has an importance that it is difficult to over-estimate. It was found to be an almost ideal insecticide. It brought to a rapid end the mass epidemics of typhus and louse-borne relapsing fever, which during the war threatened the population of Naples and other Mediterranean cities. It has proved to be of the greatest value in the control of malaria, dysentery, cholera and many other insect-borne diseases.

Overseas Fellowships for Service Medical Officers.

When General Burston visited the allied countries in 1945 to gain first-hand knowledge of their medical services, he endeavoured to obtain travelling scholarships for a few of the best of our younger graduates, to enable them to be sent to some of the leading medical schools abroad, so that they might on their return assist in raising the standard of teaching in our own medical schools. He was almost overwhelmed by the generosity of the responses to his requests; and it gives me the greatest pleasure to acknowledge this publicly, and to express the deep gratitude of the profession to the donors.

The Medical Advisory Committee of the Nuffield Foundation promised fifteen fellowships for 1946-1947, each of £400 sterling *per annum*, plus the cost of passage to and from the United Kingdom, and in approved cases even the cost of passage for wives and an extra allowance for them. In the United States, the Rockefeller Foundation gave 15,000 dollars, sufficient to maintain four Fellows for twelve months. It was stipulated that they should be medical men holding teaching appointments and interested in research. The Carnegie Trust agreed to give 30,000 dollars for fellowships for men who had been junior teachers in medical schools, so that they could brush up their medicine or surgery for three or four months in America before returning to their teaching. The Rockefeller Foundation is continuing its fellowships, but the Carnegie Trust's generous gesture was only to help in the immediate post-war period.

Both the Nuffield and Rockefeller Foundations were anxious to know what we were doing to help ourselves, and General Burston, on his return, approached the Central Council of the Red Cross Society, which most generously agreed to give enough money for twelve more fellowships similar to the Nuffield Fellowships. The Royal Australasian College of Surgeons also increased the Gordon Craig Travelling Scholarships to make them financially equal to the Nuffield Fellowships.

The total value of all the fellowships was somewhere in the vicinity of £60,000, and between forty and fifty medical officers have benefited by them. The profession owes its sincere thanks to General Burston for what he did to obtain this important contribution to medical education in Australia.

During his visit overseas, high appreciation was expressed on all sides and in all countries of the help given by the Australian Army Medical Corps in the solution of the problems of tropical warfare. The standing of our corps was never higher, and this was a great achievement for a service that existed on such a small scale prior to the war.

CONCLUSION.

I have now described, although very briefly, the main aspects of the work of the profession during the war. I have had to omit much, especially the valuable work of the Medical Equipment Control Committee in meeting essential medical requirements, when many of the usual sources of supply were not available. I have told how the profession was coordinated, how the medical services responded to their great test, how civil medical practitioners carried on short-handed and without respite, and how the whole profession cooperated to the fullest degree, and by a loyal and continued effort made certain that both the services and the civil community were adequately served during the most difficult and fateful years of our national existence.

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Religious Services.

Special church services were held on the morning of Sunday, August 15, 1948, at Saint George's Anglican Cathedral and at Saint Mary's Roman Catholic Cathedral.

At Saint George's Cathedral the service was conducted by the Very Reverend G. T. Berwick, Dean of Perth, and the Reverend Joseph Green, of Wesley Church, Perth. Members of Congress, wearing academic dress, walked in procession, headed by the Lord Mayor, in his robes of office, and councillors, from the Town Hall to the cathedral. The sermon was preached by the Very Reverend the Dean, who took as his text the 26th to the 28th verses of the eleventh chapter of the book *Deuteronomy*: "Behold, I set before you this day a blessing and a curse; the blessing if you shall harken unto the commandments of the Lord your God; and a curse, if you shall not harken unto the commandments of the Lord your God, but turn aside out of the way which I command you this day to go after other gods which ye have not known."

He said that the world was very sick. Many who proclaimed remedies did not go deeply enough in diagnosis and mistook symptoms for causes. The root of the world's distresses and dangers lay in idolatry—the setting in the place of the living God of that which was no god. When anything became the really directive force in man's life, the ultimately controlling factor, it became his god. The political, the national, the State objectives of many people were not bad in themselves; the harm came when people offered to them the unqualified service which should be given to God alone. Most people worshipped several

gods, and to them came the warning of the text—that of the blessing and the curse. For all man's intelligence and genuine good will, he seemed to be bedevilled—the things which should be for man's good had turned upon him. Instead of placing hope in them man feared them. Science could not save humanity. The things which science brought were tools to be used for good or evil. Until man acknowledged that he was a sinner he could not come to grips with truth. All knowledge and skill, all the things which man had richly in the world today, could be used safely only in the service of the living God. The skill and knowledge of medicine and surgery seemed to have been used for the betterment of mankind, but there were matters which gave pause to think whether even medicine would not become a curse if it was used for wrong ends, in the service of false gods. In that regard the preacher mentioned bacteriological warfare, artificial insemination, compulsory sterilization and euthanasia. Almost alone in the world, Christians had a reverence for life and for persons; without that reverence to what purpose would new powers be put? Was not the curse beginning to show itself? What god did those present worship? If they said that they were not interested, they still had a god, even though it might be only the god of self, the god of ease and pleasure. Medical men and women might use their knowledge to help suffering mankind, but always there would arise occasions when, if they worshipped false gods, they would be unable to give the help that was needed. The worship of the

living God was costly and demanded sacrifice of time, money and energy. It was not enough to worship God vaguely; worship of God needed to be enshrined in definite acts of worship. Only by worship of God could man be delivered from the perils of idolatry, perils which became ever greater as knowledge and skill became greater.

At Saint Mary's Cathedral the Roman Catholic Archbishop of Perth, Dr. Prendiville, presided at a Solemn High Mass. Members of congress were present in academic dress. Mass was celebrated by the Reverend Father John Hogan and the sermon was preached by the Reverend Father T. Perrott, S.J.

In the course of his sermon the preacher used the following words: "Bring to others freedom from pain and suffering, but never forget that the body which you tend is but the frail shell in which dwells an immortal soul. Remember that you will have to answer personally to God for your actions. Your power of life and death is great, so therefore do nothing unworthy of your high calling, nothing contrary to the laws of God or the laws of nature."

"Be strict about the practice of your religion, be conscientious about your work and scrupulous in applying to your profession the moral principles of the Church."

Inaugural Meeting.

The sixth session of the Australasian Medical Congress (British Medical Association), Perth, 1948, was formally opened in the Winthrop Hall, University of Western Australia, on the evening of Monday, August 16, by His Excellency the Lieutenant Governor of Western Australia, the Honourable Sir James Mitchell, G.C.M.G.

The President, Dr. D. M. McWhae, in calling upon Sir James Mitchell to open the congress, said that messages of good wishes for the success of the congress had been received from the Parent Body in London, from the Canadian Medical Association, from the American Medical Association, and from the Ceylon Medical Association.

His Excellency Sir James Mitchell said that the British Medical Association in Australia had been formed sixty-two years previously and had held many meetings in many capitals. It had taken all that time to reach Perth. He referred to earlier days in the backblocks of Western Australia, when medical aid had been almost unknown. Sir James then declared the congress open.

The Premier of Western Australia, the Honourable Ross McLarty, speaking on behalf of the Government of Western Australia, welcomed the delegates to the State.

President's Address.

Dr. D. M. McWhae, the President, then read his address (see page 337).

Vote of Thanks.

Sir Henry Newland, the President of the Federal Council of the British Medical Association in Australia, proposed a vote of thanks to His Excellency the Lieutenant Governor for having declared the congress open. Sir Henry Newland referred to His Excellency's many years of close experience of the country areas of Western Australia and to his interest in the problems they presented. The vote of thanks was carried with enthusiasm.

Public Lecture.

On the evening of Wednesday, August 18, 1948, Professor F. M. Burnet, of the Walter and Eliza Hall Institute of Medical Research, Melbourne, delivered a public lecture in the Winthrop Hall, taking as his subject "The Continuing Conquest of Disease". He listed the seven great epidemic diseases, malaria, plague, cholera, smallpox, typhus, yellow fever and influenza, and spoke of the history of each in turn. He discussed recent research on yellow fever, smallpox and influenza, dwelling particularly on the last-named, with which he had had much experience.

Professor Burnet concluded with some remarks on research in relation to the teaching and practice of medicine, considering amongst other things the justification for research and the object of medical science, as of science generally, which was, he said, to build knowledge into an integrated pattern, a pattern which would increase indefinitely in extent, in completeness and in accessibility and yet would always leave more to be discovered. The lecture was published in full in the issue of September 11, 1948, at page 281.

Plenary Session.

Pulmonary Tuberculosis.

A plenary session of congress was held in the Winthrop Hall, University of Western Australia, Dr. D. M. McWhae, the President, in the chair. The session was called to discuss pulmonary tuberculosis.

The President said that the subject to be discussed at the plenary session was "Pulmonary Tuberculosis". Tuberculosis had been the *motif* of the last congress in Adelaide eleven years previously, but much information had been gained since then.

In Scandinavia and the United States of America great progress had been made in the control of tuberculosis, and the procedures adopted there were available for study.

Mass miniature radiography had been used on a large scale in many countries, and an authoritative report on it

had been issued in England in 1945 by the Medical Research Council. (Screening films alone were insufficient grounds for the diagnosis of pulmonary tuberculosis, but they showed who should be sent for further investigation at chest clinics.)

Tuberculin testing was a valuable adjunct to miniature radiography when large numbers of persons were being examined. (Dr. H. E. Hilleboe, associate chief of the Bureau of State Services, United States of America, stated that even if film findings were suspicious, a negative result to the tuberculin test indicated that some cause other than tuberculosis must be found for the abnormal shadows.)

More refined methods of diagnosis had been developed in the past few years, as shown by the fact that many

persons who were formerly considered to be non-infectious had proved to be infectious.

It was not sufficient to find infected persons. The most dangerous to the community was the chronic infective "carrier", who, if undiscovered, might go on for years, always with a "positive" sputum and spreading infection; and special legislation was necessary to cover the isolation of individuals who refused to cooperate. All persons so discovered with a positive sputum should, if possible, be admitted to hospitals or sanatoria, in order to be instructed how to avoid spreading infection. But this demanded careful consideration of the total number of beds required, in order to determine how far it was practicable to provide accommodation for all infected persons.

The control of bovine tuberculosis was an easier matter. The ideal was that all milk should come from attested herds, but failing this, some form of heat treatment was the only solution.

"B.C.G." vaccination had been carried out extensively in Scandinavia, where over a million people had been voluntarily vaccinated; but Great Britain had taken little interest in it. Professor J. W. S. Blacklock, in a lecture at the London University in March, 1947, stated that it would be a long time before it would be possible to assess and pass final judgement on the efficiency of "B.C.G." vaccination, and that fifteen to twenty-five years would be necessary to allow its effects to be judged in the young adult age group, in which tuberculosis was such a serious problem. At the International Conference of Physicians in London in September, 1947, there had seemed to be little enthusiasm for its use in Great Britain, although Professor W. H. Tytler considered it to be well worth while in special cases. Yet it had proved to be a safe procedure and appeared to give a high degree of protection. According to Holm, of Denmark, 95% of persons gave a positive response to the Mantoux test four years after vaccination.

These aspects and others of the campaign against tuberculosis would be dealt with during the discussion. Treatment would be considered, but the surgical treatment of pulmonary tuberculosis, owing to lack of time, would be deferred to the Section of Surgery.

After-care, rehabilitation and the measures necessary to protect the patient's family against economic distress were essential parts of the fight against tuberculosis and would also be discussed.

In February, 1948, a plan, submitted by Dr. H. W. Wunderly, the recently appointed Commonwealth Director of Tuberculosis, with the object of reducing tuberculosis to a problem of minor importance within twenty years, had been adopted by the Federal Government. It was hoped that this full-scale examination of the problems of pulmonary tuberculosis would assist in the execution of a comprehensive plan for its control, defining Commonwealth and State responsibilities and leading to uniformity of the methods adopted by the individual States.

H. W. WUNDERLY (Canberra) read a paper dealing with the problem of the control of pulmonary tuberculosis. He discussed the problem under five main headings: prevention, case finding, medical care and isolation, after-care and rehabilitation, and economic security for patients and their dependants. He said that methods of prevention were general and specific. General requirements for prevention were to ensure that the population was well housed and well fed, that it received an adequate wage and was assisted to use its leisure wisely. The first and greatest need was education of the public and through its members education of those who represented them in Parliament. Such bodies as national tuberculosis associations showed governments how the problem should be tackled. Specific methods of prevention included isolation of patients with "positive" sputum and vaccination with the bacillus of Calmette-Guérin. "B.C.G." vaccine would shortly be produced in the Commonwealth Serum Laboratories and would be used on a voluntary basis on groups of people exposed to infection. "B.C.G." vaccination was a method of prevention, not a cure. It was used so that persons whose skin did not produce a reaction would become

reactors and would thus be enabled to develop an increased resistance against a subsequent tuberculous infection. In regard to case finding, the miniature radiograph was merely a sieve to select those who had to be submitted to further investigation. The presence of a probable abnormality suggested by a miniature film had to be confirmed on a full-size film. If this suspicion was confirmed and if the skin gave a reaction to tuberculin, the subject ought then to be submitted to a complete clinical and bacterial examination. Case-finding surveys should be conducted even if there was a shortage of beds. If infective persons could be located and, by education and treatment, made non-infective to those with whom they came in contact, the medical profession would have gone a long way towards stopping the spread of tuberculosis. In general surveys it was found that three in every thousand people were in need of treatment, but when those who were not, or who thought they were not, in good health were surveyed, three in every hundred persons were found to be suffering from tuberculosis in a form that required treatment. In these circumstances it would be wise in the first instance to restrict surveys to groups in which the largest number of infected persons were likely to be found. As a rule it was not worth while examining with X rays children under the age of fifteen years, but merely those who gave a reaction to a skin test. If adults with tuberculosis in an infective stage could be found it would soon be possible to cease worrying about tuberculosis in children, provided milk was pasteurized and tuberculosis in animals eradicated. In regard to medical care and isolation, it was not necessary to put to bed all patients with minimal disease, but they had to be under continual observation. Most of them were not infectious at all. Infection was spread by infected sputum, and most patients could be taught to control their cough. Patients could be educated in such a way that they ceased to be a danger to anyone. Beds in sanatoria should be reserved for the remediable "sputum-positive" patients. Many of the beds in sanatoria were occupied by unsuitable patients. It had been estimated that the number of sanatorium beds available should be three times the number of annual deaths. Accordingly there was a shortage in Australia of 50% of the beds required. It was, however, not much good erecting a lot of new buildings if beds could not be occupied owing to staff shortage. First priority in building should be given to improving conditions under which nursing and domestic staffs were expected to live. After passing reference to after-care and rehabilitation, with which another speaker would deal, Dr. Wunderly discussed economic security for tuberculous patients and their dependants. In this aspect of the subject the Commonwealth Government had done something and proposed, with State cooperation, to take a more active part in the war against tuberculosis.

LINLEY HENZELL (Perth) read a paper on the treatment of pulmonary tuberculosis. He pointed out that there were two aims. The first, from the public health aspect, was to render the infectious patient non-infectious. The second, from the patient's point of view, was to preserve his respiratory function and to restore his capacity for work. It was only after a long experience in many cases that a physician could hope to select the type of treatment that was necessary. The evaluation of the effects of treatment was complicated by many factors, and the establishment of control groups for statistical purposes presented almost an insuperable difficulty. Workers in tuberculosis were convinced almost without exception of the value of collapse treatment. However, a comparison of mortality in any community where extensive collapse measures had been instituted within recent years with the mortality of a period before their institution was vitiated by a possible natural biological change in the relationship between the parasite and its host, and by progressive changes in the economic, nutritional and educational standards of the community. Clinicians were so convinced by the beneficial results observed by them that they continued to urge the treatment on their patients. The growth of chest surgery and improvements in radiological technique had revolutionized ideas about the treatment of pulmonary tuber-

culosis. The modern chest hospital had replaced the sanatorium in the treatment of "the acute case". The sanatorium was used more for the restoration to normal living conditions of the ambulant patient in the course of his rehabilitation, as the home of the chronic sufferer, and as the centre for training for sheltered workshop, settlement or new occupation. The members of the "chest team" should not work in water-tight compartments—any decision made in treatment should be the decision of the whole team, made after full examination and discussion.

Dr. Henzell dealt shortly with the principles governing the various lines of treatment. He insisted that rest in bed implied mental and physical relaxation and called for sympathy and cooperation between doctor and patient. Rest was the mainstay of all forms of treatment in pulmonary tuberculosis; no other treatment would succeed without it, and it would often succeed alone. Graduated exercise was harmful for active disease and should be reserved for the stage when quiescence had been achieved. Though artificial pneumothorax produced rapid improvement with disappearance of sputum, there was "a long road home". The realization that the permanent control of disease by an artificial pneumothorax was limited by certain types of disease had led to an increased use of thoracoplasty, combined with apicectomy and done in stages. Operative treatment produced satisfactory results in 80% of suitable cases. In some instances lobectomy was a suitable procedure. The success of operative measures depended largely on the post-operative care of the patient.

Dr. Henzell referred to streptomycin, which had not fulfilled its early promise in the average case, to tuberculin, to the use of gold and to procedures for the closing of tuberculous cavities. For a large number of patients coming under treatment in a late stage of the disease no line of treatment offered much prospect of permanent improvement. The aim had to be the detection of all infections in their early stages.

D. R. W. COWAN (Adelaide) read a paper in which he discussed the social implications of tuberculosis and rehabilitation. He said that as a purely medical problem the control of tuberculosis was no easy matter; economic considerations and the need for after-care caused additional difficulties.

The chief characteristics of tuberculosis were that it was a communicable disease, it was in most cases a chronic disease, and it was a disease peculiarly liable to relapse. The economic factor was perhaps the greatest obstacle to its effective control. Relief should be granted to the sufferer in early as well as in late stages of the disease, there should be no application of the means test, the convalescent sufferer should be allowed to work, to earn and to retain some measure of relief until he reached the stage of economic independence; the family income should be not less than the basic wage.

Attention was drawn to the magnitude of the tuberculosis problem from the economic aspect. A fully developed social service or almoner's department was essential to any properly set up tuberculosis service. The value of the preventorium was stressed in cases in which there was difficulty in placing children of tuberculous parents. Attention was called to the useful role played by voluntary associations in assisting the official health agencies and to the need for the creation of an Australian Tuberculosis Association. Some measure of compulsion was needed in dealing with recalcitrant patients and in the examination of "contacts" and "suspects" who refused to submit themselves voluntarily. Effective treatment was the first step in rehabilitation of the tuberculous. Many factors contributed to relapse and prominent amongst them were return to unsuitable living and working conditions. Without proper after-care sanatorium treatment inevitably in many cases would end in failure.

Owing to the potentially infectious nature of the disease some special form of rehabilitation was necessary for the tuberculous. Different forms of rehabilitation were discussed. The most favoured plans were the village settlement and the day workshop. The plan evolved in Adelaide was a compromise between the two and involved

the establishment of a modern factory and suitable living conditions for the workers. Suitable types of industry were discussed. Especial emphasis was laid on the necessity to provide relief of some sort in the early stages of rehabilitation and until the stage of economic independence was attained.

J. C. SPENCE (England) said that it was 144 years since René Laennec had written his essay on tuberculosis and it was amazing that at only twenty-four years of age he had been able to conceive of the association in the same disease of the various lesions, which were so separate in nature and distribution, before the germ theory and without the aid of the microscope; it was indeed one of the major achievements of medicine. Professor Spence then referred to the modern trend of interest in the social control of the disease and laid emphasis on the need for a scientific attitude. Tuberculosis was a disease with so many variations and of such duration that its study required special aptitude and patience, a patience rarely attained except by men like Darwin himself or Mendel. One result of the removal of the control of tuberculosis to public health authorities was a decline of interest in the subject in teaching hospitals and universities. He wished to state the opinion that clinical schools and university departments should be encouraged to maintain that interest and to have access to the study of the disease for research. An essential in scientific and clinical studies of a disease was to establish a clear concept of its progress and its variations. It was comparatively easy to use scientific observation and control of short-lived diseases; but in tuberculosis the course varied with the age of the subject, with his race, with his occupation and with many other factors. Professor Spence felt that light was breaking in one field—that of tuberculosis in childhood. If a child was infected a reasonably clear sequence of events would ensue and the progress could usually be foretold. Six weeks after the primary infection the rise of allergy could be detected and erythema nodosum and certain other events followed. For example, in the thirteenth or fourteenth week there might be dissemination with tuberculous meningitis. This was an example of the practical value of an exact knowledge of the natural history of the disease. From such evidence one could go back over the history of the case and the circumstances of the patient's sojourn thirteen or fourteen weeks earlier and find the contact. Although it was known that if primary infection took place under the age of six months more than 50% of the patients would die, and that even up to two or three years the mortality rates were little better, when primary infection occurred between the ages of five and fourteen years the disease process was usually benign. It was necessary therefore to take into consideration the natural disease processes under varying conditions in studying tuberculosis. He entered a plea that all should return to the study of the disease and assess scientifically the results of modern treatments. The course at different stages was not accurately known, and those trained in clinical science must be available to study it. There had been many tuberculin surveys, but none were adequate or satisfactory. The aim of tuberculin surveys was to know the age at which each child yielded a positive reaction and to deduce from that facts about the source of infection.

Professor Spence then, with special reference to his department in England, said that they worked in close contact with the public health department in the city. That was good for his students and widened the scope of research. In a special survey at present being conducted children were being tuberculin tested every six months. In conclusion he made the point that medical schools, teaching hospitals and universities must do more to help the public health departments to know the disease better, and added that something would have to be done to protect individuals by vaccination. He emphasized his attitude by quoting René Laennec's words:

I profess free medicine. I am not with the ancient or with the modern, but seek the truth in each and test everything by repeated trial.

They should make sure that the efforts attempted were worth while.

KEITH M. HALLAM (Melbourne) read a paper on the limitations of the role of the radiologist in the diagnosis of pulmonary tuberculosis. In limiting the spread of pulmonary tuberculosis, radiology played two different parts with varying limitations. When microfilms were used the radiologist was limited simply to sorting out examinees who might be suffering from disease from those who appeared to be free of disease. So dangerous was the micro method, if not properly handled, that the highest standards of meticulous care in the production of films and in the reading of them were demanded. In large film surveys the radiologist had a higher place as a medical practitioner. The part of the radiologist in the elimination of the disease itself was the detection of persons clinically suspected of suffering from pulmonary tuberculosis and the X-ray supervision of persons with known infections. There had been an ante-bellum period when radiologists "screened" all persons sent for X-ray examination of the chest and took an appropriate history. It was hoped that some day, when more radiologists were available, radiologists would be able to resume that practice. The shadows of disease were visible and the radiologist had a basis for suppositions. In the case of those patients for whom it was not possible to obtain positive bacteriological findings, serial films taken at intervals of a month or two might with reasonable certainty proclaim the condition to be tuberculous, or the progressive, regressive or static quality of a lesion might be declared. After referring to the "taste" as possibly influencing their opinions about pathological changes seen in films, Dr. Hallam pointed out that different radiologists sometimes gave differing opinions about a film and also that one radiologist might on different occasions give differing opinions on the same film. He also referred to the provision of radiologists with a clinical history of the patient and said that ideally the radiologist read the film in association with the clinician. The radiologist should be a consulting coordinating doctor and not a guerilla technical quack. In conclusion he said that the X-ray film might be the significant picture in the jigsaw of signs, symptoms and relevant history, but it was given to the clinician to fit into the proper place. The real permanence of the practice of medicine lay not in mechanical inventions, but in history taking and careful observation, the proper instruments of the true physician possessed by an innate urge to cure and comfort the sick.

ALAN KING (Perth), discussing Dr. Wunderly's paper, said that although tuberculosis was a waning disease, the existing annual death rate warranted increased effort towards its eradication. Canada showed the way in case finding: 1,500,000 people had been radiologically examined in the preceding twelve months. In Scandinavian countries tens of thousands of people had been safely vaccinated with "B.C.G.". Tuberculous dairy cattle in Australia were still an important source of the tubercle bacillus; in the United States of America tuberculosis of bovine origin was almost unknown. In Australia the necessity for a case-finding survey by means of the Mantoux test was stressed, particular attention being paid to the five to ten, ten to fifteen and fifteen to twenty years age groups. The Mantoux test excelled every other procedure as an epidemiological agent. Dr. King agreed with Dr. Wunderly that every case possible must be discovered; mass radiography must be used in the most efficient manner, a beginning being made with the priority groups mentioned. When a State failed to provide sufficient hospital beds it was committed to a plan that was wasteful, ineffective and costly. Isolation in the home was not so effective as isolation in hospital. Dr. King was in agreement with Dr. Cowan, who had drawn attention to the need for compulsory isolation of recalcitrant infective patients; in some instances isolation might be so overwhelmingly in the public interest as to render defensible the provision of legal machinery to that end. Another problem was the leak in the defences which permitted persons with active tuberculosis to enter Australia as immigrants; all immigrants should be subjected to X-ray examinations of their chests. In conclusion Dr. King said that the essential element of tuberculosis control was to have a health-educated community.

COTTER HARVEY (Sydney) said that he agreed with almost everything that Dr. Henzell had said, but had some comments to make in the light of recent experiences in America. Considerable emphasis was being placed on the importance of the psychological state of the patient. Not only was he suffering from pulmonary tuberculosis; his environment had been disorganized, his life pattern had been rudely shattered; he felt that he faced a broken career, financial disaster, a wrecked home or the loss of his betrothed; he was beset with the gnawing fear of destruction from his disease. Modern psychosomatic medicine no longer permitted a single diagnosis; the total personality of the patient and all his reactions to his new situation must be appreciated. Thus rehabilitation was recognized as an integral part of treatment, which began on the patient's entry into the modern sanatorium and continued until he was reestablished as a self-supporting unit in the community. How far rehabilitation should go in hospital or sanatorium was still the subject of discussion; but it always began there, and in many cases it required to be carried no further. Hinshaw had stated that streptomycin had the power of suppressing the growth of tubercle bacilli in certain cases for a limited period of time. It was best given before bacterial necrosis had occurred. It did not alter the natural history of the disease, and it was most important that all other forms of treatment should be considered or employed in conjunction with streptomycin. More than ever it was necessary that pulmonary tuberculosis be treated by specialists. More care was required in assessment and greater responsibility fell on the thoracic surgeon; he could now operate on softer lesions earlier. Drug resistance was frequent, so that the average patient could have a prolonged course of streptomycin once, and once only. Hence the need for meticulous care in timing the exhibition of the drug. Pulmonary resection in first-class clinics had become a fairly safe procedure. The tendency was to give streptomycin for a shorter time and in smaller doses. Only a small proportion of patients were suitable for streptomycin treatment. Dr. Harvey then mentioned new drugs that were being tested for action against the tubercle bacillus. One only, para-amino salicylic acid (P.A.S.) had graduated to the clinical field. It was thought likely to be of use in combination with streptomycin.

Dr. Harvey went on to discuss the lung immobilizing chamber of Alvin Barach. He said that it worked on differential pressure; the patient, while enclosed, ceased to breathe. He remained in the chamber for about ten continuous hours once a day for some months, thereby securing rest as complete as was compatible with life. It was thought that the ingenious apparatus might be of value in other conditions, such as toxic goitre and some cardiac disorders. Referring to collapse therapy, Dr. Harvey said that it needed no defence, but it did need protection, as Dr. Henzell pointed out, from the inexperienced, the overbold and the optimistic. It was a serious procedure. In that connexion Dr. Henzell had stressed the importance of team work and staff conferences. It remained to add that isolated sanatoria with small staffs were handicapped in that respect. Pneumoperitoneum seemed to have established itself, possibly in combination with phrenic crush. However, it should be regarded as an occasional rather than as a routine procedure. Extrapleural attempts to close pulmonary cavities had resulted in two novel techniques. The first was the packing of the space with methyl methacrylate spheres. Immediate results, especially in the "failed thoracoplasty" cases, seemed good. However, some clinics had found that later complications, especially migration of the balls, had caused trouble and they had abandoned the procedure. Fibreglass wool was being used to pack the space left after extrapleural pneumolysis. Fibreglass woven fabric was used either as a container to cover a lobe which it was intended to keep atelectatic or as a bag to form an extrapleural splint. Clinical results with the two last-mentioned prosthetic agents were encouraging. The future might hold further success for the antibiotics and the surgeons might soon dominate the therapeutic field. However, America had a goal—that of prevention. Dr. Harvey believed that before the close of the century tuberculosis would be

completely eradicated from large areas if not from the whole of the United States and Canada.

E. A. NORTH (Melbourne), discussing the role of "B.C.G." vaccine in the control of pulmonary tuberculosis, said that killed vaccines had so far proved ineffective against tuberculosis. Calmette and Guérin, by special cultural methods, in 1906 began to attenuate a virulent bovine strain of *Mycobacterium tuberculosis*. By 1921 they had claimed that it was harmless to animals and man and had produced some immunity in animals. Vaccination of humans with that strain (B.C.G.) had since continued, but no final agreement had been reached on its efficacy or on the best method of administering it. The procedure was now almost universally regarded as safe. Long-term adequately controlled studies still in progress indicated protective effects in three groups of persons: (i) new-born babies and children specially exposed to infection, (ii) hospital personnel who did not react to tuberculin, and (iii) young susceptible North American Indians living under poor hygienic conditions. In the present state of knowledge it was held that persons should be revaccinated when they again ceased to react to tuberculin. The consensus of opinion in Scandinavia and in the United States of America favoured the intradermal injection of "B.C.G." rather than administration by multiple puncture or scarification. The results of recent overseas studies warranted the introduction of "B.C.G." into Australia to protect specially exposed groups: for example, (i) hospital personnel who did not react to tuberculin and (ii) new-born infants and non-reactors among children in infected households.

HERBERT GRAY (Perth), on behalf of MILTON COUTTS (Sydney), who was unable to be present, read a contribution on the subject of pulmonary tuberculosis from the point of view of the bronchoscopist, based on 500 bronchoscopies carried out in the examination of 133 proved phthisical patients, of whom 100 were inmates of the Randwick Auxiliary Hospital. Of the total number, 42 or 32% had endobronchial tuberculosis, as evidenced by clear nodules, granulations, ulcerations or stenosis. Of the 42 endobronchial lesions, 17 showed clear granules or granulations, eight showed multiple bleeding ulcerations or granulations or both, and 17 showed bronchial stenosis.

The indications for bronchoscopy in cases in which phthisis was known to exist or was suspected were the following: (a) hæmoptysis, (b) persistent wheezing, (c) unexplained pulmonary collapse, (d) failure of cavities to collapse after the induction of artificial pneumothorax, (e) as a prelude to collapse therapy, (f) for purposes of aspiration after each stage of thoracoplasty, (g) for bronchial lavage after complete thoracoplasty, (h) for a bilateral sputum test before collapse therapy, (i) in the radiographic diagnosis of upper lobe tuberculosis.

With regard to endobronchial diagnosis and treatment, the speaker said that in early bronchogenic tuberculosis the patient was usually submitted to bronchoscopy because of hæmoptysis. In the stage of proliferative granulations application of silver nitrate (30% solution) destroyed the superficial granulations, widened the lumen of the bronchus and allowed drainage and ventilation of the areas beyond. Aspiration then produced quantities of retained sputum. Liberal application of silver nitrate might bring about healing of ulcerations and destruction of granulations. In chronic bronchial stenosis application of silver nitrate might defer eventual fusion of granulations, which could cause complete atresia. Repeated lavage after complete thoracoplasty had brought about steady improvement in the mucosa with lessening of sputum and improvement in the patient's general health. Phthisical patients had without exception proved excellent subjects for bronchoscopy and there had been no evidence of untoward effects.

ALAN PENNINGTON (Melbourne) said that he wished to refer to one other matter. In the emphasis laid on the importance of finding tuberculosis by mass radiology they were rather inclined to think that the majority of the abnormal shadows were necessarily due to tuberculosis. To correct that source of error it was essential that mass radiological surveys should include pathological laboratory investigations. He wanted to plead that each mass radio-

logical unit should have associated with it a pathological laboratory. Errors arose from a lack of education not only of the public, but also of the doctors. It was necessary to determine the cause of the abnormal shadows. At times they were due to conditions of graver significance even than tuberculosis, and by their recognition surgeons might have a chance to cure patients before symptoms arose. They should carry out full pathological investigations as part of the survey.

JOHN DALE (Melbourne) announced that he wished to strike a discordant note. He thought that seven years previously, at the Adelaide meeting, congress had advocated that every home should be made a sanatorium. At that stage uniform treatment was desirable, but he was beginning to regard the advent of his friend Dr. Wunderly as Commonwealth Director of Tuberculosis as a menace. Previously they had not had any expert at Canberra in the position to make the ultimate decision on what the States should do, and Dr. Dale thought that it was madness to attempt uniformity in Australia. He was also alarmed that in the present war against tuberculosis the people were to be educated to fear—to learn about all the evils of tuberculosis and to know the risks they ran. If such a sum as £40,000,000 were to be expended on general education for life and marriage, he believed that the general effect on tuberculosis was likely to be as good. It was on the degree to which people learned to live that their health depended. In essentials tuberculosis was not so much an evidence of ill health as a disease in itself caused by a common human parasite of relatively low pathogenicity and comparatively harmless for those who were in good health, with sound nutrition and satisfactory environment. So far as milk was concerned, it could even be better for children to drink milk containing an occasional germ than to prevent them from ever drinking any milk. The improvement of general social conditions was of enormous importance in the problem under discussion. The steady decline of the disease over the past hundred years was due more to the improvement in living conditions than to anything which scientists and doctors had been able to introduce.

W. J. NEWING (Melbourne) commented on what he called the homely subject of rest, which he considered was not adequately carried out in the early stages of the disease, when the patient was wavering between cure and extension of the disease process. Satisfactory rest for the purpose was not obtainable in public hospitals or private homes. In all cases in the early stages of the disease it was possible for the doctor to stop the coughing, which was the first essential in any scheme of rest. Visitors had to be controlled and the friend who wished to make the patient laugh was a menace. Talking and laughing should be reduced to a minimum, and it was his practice to put the patient who was a chatterbox on to silence. He added that he was prompted to make those comments because it was becoming the custom for hospitals to assume responsibility for the care of young students and nurses who were infected and to hold them for six months or longer. In that connexion he wished to repeat that adequate rest was not possible there, and it was not in the interest of the young people that the hospital should care for them on the spot.

The President said that before closing the session he wished to propose a resolution that the congress supported the formation of a national tuberculosis association in Australia. Reference had been made by several speakers to the important work done by the voluntary tuberculosis associations in the control of tuberculosis. All those who had first-hand knowledge of the work of those bodies in other countries spoke in the highest terms of its value; that was especially the case in regard to the National Tuberculosis Association of the United States and of Canada. Practically every forward move in the control of tuberculosis in the United States was initiated by the National Tuberculosis Association. In Australia there was no national tuberculosis association, although some States had tuberculosis associations. There were many Australia-wide problems in tuberculosis control, including Commonwealth tuberculosis allowances and pensions, the means

test and all its implications, and the Federal immigration programme and its relation to tuberculosis. Those would best be dealt with by an Australian tuberculosis association, which would also stimulate the formation of associations in all the States and would give encouragement and guidance in their activities. The President therefore proposed the following resolution:

Recognizing the gravity of tuberculosis as a medical and social problem, and being aware of the important part played in its control by voluntary associations in other countries, this meeting of congress expresses its approval of the inauguration of an Australian Tuberculosis Association.

D. R. W. COWAN (Adelaide) seconded the President's motion. He quoted the words of Sir William Osler

("Principles and Practice of Medicine", Seventh Edition, 1909):

A last word on the subject of tuberculosis for the general practitioner. The leadership of the battle against this scourge is in your hands. Much has been done: much remains to do. By early diagnosis and prompt systematic treatment of individual cases, by the prompt recognition of contact cases, by striving in every possible way to improve the social condition of the poor, by joining actively in the work of local and national anti-tuberculosis societies you can help in the most important and the most hopeful campaign ever undertaken by the profession.

The motion, on being put to the meeting, was carried.

Combined Meetings of Sections.

SECTION OF ANÆSTHESIA, SECTION OF SURGERY AND SECTION OF PUBLIC HEALTH, TUBERCULOSIS AND TROPICAL MEDICINE.

The Surgical Treatment of Pulmonary Tuberculosis.

A COMBINED MEETING of the Section of Anæsthesia, the Section of Surgery and the Section of Public Health, Tuberculosis and Tropical Medicine was held to discuss the surgical treatment of pulmonary tuberculosis.

C. J. OFFICER BROWN (Melbourne) read a paper on the resection of lung tissue for pulmonary tuberculosis. He said that in 1942 Thornton and Adams had reviewed the results of resection, collecting a series of 29 pneumonectomies and 46 lobectomies from the literature. The mortality rate was 45% for pneumonectomy and 25% for lobectomy. Persistent bronchial fistula, empyema and contralateral spread were the common complications responsible for most of the deaths. Improvements in operative technique and anæsthesia had almost eliminated the risks of bronchial fistula and empyema. In May, 1946, Overholt had reported a series of 69 lobectomies and 120 pneumonectomies, the operative mortality rates being 7.3% and 17.3% respectively. Overholt's later figures were even better. Of the lobectomy patients 57% were well, with sputum free from tubercle bacilli, and of the pneumonectomy patients, 27%. The results were highly satisfactory if it was remembered that the operations were generally reserved for patients who had no other prospect of recovery. Resection was indicated for patients who had high-grade bronchial stenosis or tuberculomata or cavities persisting after thoracoplasty. Lower lobe cavities which had resisted other forms of treatment could be controlled only by resection. When acute pneumonic tuberculosis (unilobar or unilateral) continued to advance despite bed rest and streptomycin treatment, resection might give the patient a chance of recovery. At the present stage of its development resection should be regarded as an additional method of treatment, and not as an alternative to collapse methods. It was generally chosen for cases in which those methods had failed or had been inapplicable; but the possibility that it might become a standard method of treatment in early unilobar disease should not be overlooked. The chief hazard of resection for pulmonary tuberculosis was post-operative spread of the disease. Overholt had introduced his face-down operating position to prevent overflow of secretions into the good lung, and the use of endobronchial catheters for pneumonectomy also helped to prevent the spread of secretions. The use of streptomycin to cover the post-operative period might prove valuable in preventing spread. Dr. Brown then gave details of his own series of cases.

F. J. CLARK (Perth) read a paper on the selection and management of cases of pulmonary tuberculosis for treatment by thoracoplasty. He said that in view of the increasing success in the extirpation of localized areas of pulmonary disease and of the steady progress in the discovery of suitable antibiotics, the future of thoracoplasty as a method of treatment was uncertain. In the modern treatment of pulmonary tuberculosis the only stable essential was rest. However, in suitable cases it seemed justifiable to recommend that method of treatment which would be most likely to shorten the period of infectivity and also the period of economic dependence of the patient. If surgical treatment would satisfy those criteria and would offer promise of more certain safety from recurrence than more conservative methods, then surgery was justified. In Western Australia careful selection of "good risk" patients for thoracoplasty had resulted in a high percentage of successful results, which had had a good psychological effect on the community. This was considered to have offset any disadvantages of such a method of selection of patients. The principle was accepted that, if collapse therapy had been selected as the initial form of active treatment, and if conservative measures had failed to produce satisfactory collapse, thoracoplasty might be undertaken provided that no contraindications were present. Adequate collapse by thoracoplasty required that the collapse should extend from above downwards to the level of one rib and one intercostal space below the level of the disease shown in the X-ray films. Candidates for thoracoplasty should be good or fair "surgical risks"; they should have a satisfactory cardio-respiratory reserve and be afebrile or have a relatively small rise in temperature; the body weight should be increasing or stationary, and few or no toxic manifestations should be present; the erythrocyte sedimentation rate should be low, but alterations in it rather than the absolute value of individual readings were significant. The realm of thoracoplasty was generally limited to upper zone and upper mid-zone lesions, in which the lateral as well as the downward collapse would be efficient; the lower the lesion, the less the likelihood of success. Tension cavities and large thin-walled cavities might become larger if treated by thoracoplasty alone; accessory initial procedures such as Monaldi drainage were required. Thoracoplasty would not close old thick-walled cavities in any part of the lung. In Western Australia patients in the higher age groups were not generally accepted for thoracoplasty. The general preparation of the patient was similar to that for all types of surgical procedures; the most important part of the pre-operative period was instruction in breathing exercises and initiation into the routine exercises which would be undertaken after operation. With regard to the choice of anæsthesia, Dr. Clark said that in Western Australia all thoracoplasties had for some years been performed under

local anaesthesia; but he would not hesitate to change to general anaesthesia if the circumstances warranted such a change. He then discussed the indications for either method, the technique of local anaesthesia as used in that State, the pre-operative medication, and the operative procedure in detail, together with the post-operative care of the patient and the post-operative complications.

R. H. ORTON (Melbourne) read a paper in which he discussed anaesthesia in the surgical treatment of pulmonary tuberculosis. He said that during recent years the physicians' approach to the problems of pulmonary tuberculosis had changed and the increasing use of surgical measures made more and more demands upon the skill of the surgeon and the anaesthetist. At first local anaesthesia was considered the only possible method, but improvement in anaesthetic methods and agents soon allowed the use of general anaesthesia without added risk to the patients. General anaesthesia had come to be regarded as the method of choice. Two of the major problems in the surgical treatment of pulmonary tuberculosis were the prevention of spread and avoidance of the activation of minimal lesions. In both the anaesthetist had to accept his share of the responsibility. The control of secretions in operations on the chest wall, such as thoracoplasty, usually was not a great problem; the position was different when the surgeon entered the thorax and embarked upon pulmonary resection. Excessive secretions might mean spread of infection to healthy areas of lung. The control of such secretions should commence in the pre-operative period, when postural coughing should be encouraged. Other measures were of variable value. During the operation the secretions were controlled by three main methods—posture of the patient, suction and occlusion, so that the diseased area of lung was shut off from the remainder of the lung tissue into which the anaesthetic agent was delivered. After operation the main methods of controlling secretions were tracheobronchial suction and bronchoscopy. Dr. Orton gave details of the precautions he observed in performing a bronchoscopic examination in such circumstances. He said that the occurrence of anoxia during anaesthesia was the greatest argument against the use of local anaesthesia for major thoracic surgical procedures; it was frequently impossible with local anaesthesia to avoid anoxia as the result of paradoxical respiration and mediastinal "flap". Both those conditions would occur during thoracotomy and thoracoplasty. Controlled respiration was essential; that was impossible if the patient was conscious and local anaesthesia was being used. Dr. Orton went on to discuss the mechanism of lobular atelectasis and its relationship to anoxia during anaesthesia. He said that with the advent of streptomycin an agent was available which was of great value in the control of spread of pulmonary tuberculosis during operation. If streptomycin was administered for a short time before operation, and in the post-operative period, then oedema fluid poured into the alveoli was likely to contain a concentration of streptomycin adequate to prevent the invasion of the fluid by tubercle bacilli. In conclusion, Dr. Orton emphasized the two most important facts for the anaesthetist in the surgical treatment of pulmonary tuberculosis—control of secretions and avoidance of all forms of anoxia.

GILBERT BROWN (Adelaide) discussed anaesthesia in the surgical treatment of pulmonary tuberculosis. He said that the essentials for satisfactory anaesthesia were eight in number: (i) The agent or agents should be such as to cause no irritation or damage to the lungs. (ii) The drug should not raise or lower the blood pressure to any pronounced degree. (iii) The method employed should ensure an unobstructed airway and adequate oxygenation of the patient's tissues. (iv) Means of efficient elimination of carbon dioxide should be provided. (v) Removal of infected secretions should be possible at all times. (vi) The method should allow anaesthesia to be prolonged should an extension of the operation demand it. (vii) After operation recovery of the cough reflex and of consciousness should be rapid. (viii) Post-operative atelectasis should be avoided. Dr. Brown discussed in detail the factors governing the choice of anaesthetic method and

the precautions which should be observed; he based his conclusions on his series of 20,519 anaesthetic records, in 537 of which the patients were suffering from pulmonary tuberculosis. He said that the records showed the gradual change in the technique of anaesthesia and the reasons for the change. The agents first used were chloroform and ether. Spinal analgesia followed, by way of ethylene, and later intravenous anaesthesia. Then came cyclopropane, trichlorethylene and finally cyclopropane in combination with curare and "Pentothal Sodium" given intravenously. Dr. Brown finally stated six conclusions: (i) Cyclopropane and oxygen anaesthesia was the most generally useful. (ii) Curare was a most valuable aid to anaesthesia in operations for the treatment of pulmonary tuberculosis. (iii) Controlled respiration was essential for the major operations. (iv) Spinal analgesia and local anaesthesia had a limited field of usefulness. (v) Ether should not be employed either as the main anaesthetic agent or as an adjuvant to the gaseous anaesthetics. (vi) Heavy pre-medication was unnecessary and dangerous.

L. I. HENZELL (Woorooloo), the State Director of Tuberculosis of Western Australia, introduced a film prepared in his directorate and entitled "Thoracoplasty". He pointed out that the actual thoracoplasty was merely an incident in treatment; what preceded and followed it was of equal or even greater importance. In his team all members collaborated in assessing the patient and deciding each step in treatment. The surgeon must have personal knowledge of the patient upon whom he had decided to operate or not to operate. He must have a wide knowledge of tuberculosis in general and of his individual patients in particular; he must not be merely a surgical technician. Dr. Henzell's team consisted mainly of officers of the Public Health Department. The anaesthetist also was an integral part of the team. It could not be too often stressed that the decision made, at each stage in the treatment, was that of the team as a whole.

The film was then shown, being accompanied by a running technical commentary by Dr. F. J. Clark.

ALAN KING (Perth) presented statistics of Dr. F. J. Clark's cases and explained the nature of the physiotherapy demonstrated in the film shown by Dr. L. I. Henzell. He said that thoracoplasty was being used more frequently than before in the treatment of pulmonary tuberculosis; one important contributing factor was that patients were more willing than before to undergo the operation, as the deformities previously resulting from its use had to a large extent been minimized. The improved postural results were due to the use of carefully graded physical therapy. The exercises used were based on the work of Price Thomas and Cleland. Before operation the whole routine was explained to the patient; he was told why he must lie straight in bed and not take up faulty postures. It was also explained that full movement of the shoulder, head and neck were aimed at by the end of the first week. The vital capacity could be increased by 200 to 300 millilitres by the correction of wrong breathing. However, education in breathing was not recommended when apical tuberculous disease might still be active or when the lesion was basal and total thoracoplasty was to be performed. Dr. King then described in detail the exercises used in the first and second weeks after first-stage thoracoplasty and after the second and subsequent stages. He showed a series of eight male patients, aged forty years or less, to illustrate the results of thoracoplasty which they had undergone at periods up to thirty months previously. All had good functional results as judged by the performance of exercises.

COTTER HARVEY (Sydney) showed spheres of methyl methacrylate and said that they had a place in thoracic surgery. They were intended to be left for a period of four or six months within fibrotic cavities in patients upon whom thoracoplasty had proved unsuccessful. They should be used with a streptomycin "cover". He pointed out that in such desperate cases a high mortality rate could not be avoided.

A. H. PENINGTON (Melbourne) said that since such a wealth of material had been presented he had time to

deal only with the question of resection. At Concord and Heidelberg repatriation hospitals the surgical turnover had been much increased by the use of streptomycin. That agent had, in Henshaw's phrase, greatly increased the responsibility of the physician and the latitude of the surgeon. Tuberculoma, discussed by Dr. Brown, was difficult of diagnosis; many conditions, such as a neoplasm, could give the same spherical shadow in a radiograph of the lung. Hence exploratory thoracotomy was desirable in such cases. The performance of thoracoplasty after pneumonectomy was advocated by many workers, probably with reason. It was the routine practice at Heidelberg, the procedure being carried out four or six weeks after the pneumonectomy. Overholt concurred in the practice. It was not difficult technically and saved trouble subsequently in the contralateral lung.

S. V. MARSHALL (Sydney) remarked that, in New South Wales, even anaesthetists were turning towards local analgesia for thoracoplasty. He asked whether Dr. Clark could detect in advance the likelihood of the development of paradoxical respiration at operation. He considered Dr. Orton's emphasis on terminal bronchoscopy to be idealistic, since it was beyond the sphere of most anaesthetists and must be carried out by the surgeon. Dr. Marshall took strong exception to Overholt's posture; he thought that it exerted a splinting effect upon the thorax and diaphragm and so led to anoxia. He congratulated Dr. Orton upon his lucid exposition of the effects of anoxia upon the alveolar endothelium. With regard to Dr. Brown's reference to anaesthesia with "Kemithal" and curare, Dr. Marshall said that if those agents were given into the same vein phlebothrombosis would be extremely likely. He was puzzled by Dr. Orton's "bronchial reflex"; curare did not inhibit bronchial reflexes, although it might inhibit the somatic response. He dissented from Dr. Brown's "weaning-off" from cyclopropane to nitrous oxide, saying that the latter was not a non-absorbable gas and that air would better serve the purpose of preventing atelectasis.

B. CLEREHAN (Cheltenham, Victoria) asked in what manner the eight men demonstrated by Dr. King were at the present time employed.

A. King (Perth) answered that they were engaged in various forms of occupational therapy, except for one, who, disregarding instructions, had worked for a while as a navy.

DARCY COWAN (Adelaide) said that recent developments in thoracic surgery had done much to protect the community, in that they removed the focus of infection from patients and prevented them from disseminating bacilli into the atmosphere. Thoracic operations, however, were severe ordeals for those who must undergo them. It might be that in the future better preventive medicine would obviate the need for surgery in tuberculosis.

Cotter Harvey (Sydney) said that he had just returned from Canada and the United States of America, and that he considered the standard of thoracic surgery in Australia to be comparable with any seen by him abroad. He paid tribute to the fine collection of pathological specimens and radiographs by which the speakers had illustrated their papers.

C. J. O. BROWN (Melbourne), in reply, complimented Dr. Clark upon his series of pathological specimens, three of which revealed massive acute tuberculosis. Surgery was obviously the only hope for the patients from whom they had come. The efficient surgical treatment was most creditable to Dr. Clark. Dr. Orton had talked as though his only function in the team had been the relief of pain. Actually his function had been to see that the patient did not suffer in any respect—a requirement which extended to operative charting, blood transfusion, endoscopy and post-operative care. It would be understood how much that conception of an anaesthetist's duty relieved the surgeon of strain. In his (Dr. Brown's) unit shock at the end of operation was almost unknown. The condition of the patient was usually good after the most severe operation and compared favourably with that of the patient who had just undergone abdominal section. He attributed all

that to his anaesthetist. In reply to Dr. Cowan, Dr. Brown said that they were not yet able to control by medical means the massive, destructive form of tuberculosis. Fortunately it was often localized and so amenable to resection. After operation the patient again became a sufferer from "medical" tuberculosis and needed the care of the physician. When antibiotics reached their final development, as they doubtless would, the services of the thoracic surgeon might become unnecessary.

F. J. CLARK (Perth), in reply, remarked that good surgical results in a community so small as Western Australia were possible only from good team work. In that respect acknowledgement was due to the resident medical officers of his unit. In reply to Dr. Marshall, he said that paradoxical respiration could be foreseen in operations under local analgesia, especially apicolysis. In the second stage of thoracoplasty it was apt to occur when the fourth and fifth ribs were stripped and before the chest wall fell in. He therefore advocated thoracoplasty in three stages, because one could estimate before each stage the possibility of the occurrence of paradoxical respiration. Replying to Dr. Cowan, Dr. Clark said that the cases and specimens presented were good arguments for the establishment of a tuberculosis association. He showed two specimens of lungs, one from a teacher and the other from her pupil, removed from the patients within a month of each other. The teacher had had long-standing cavitation; the pupil, a year's illness and generalized spread throughout one lung. In conclusion, Dr. Clark paid tribute to Dr. Fergusson Stewart, whose pathological specimens in colour, in jars of "Perspex", were of outstanding merit.

R. ORTON (Melbourne), in reply, thanked and congratulated Dr. Clark. He said that he had been privileged to act, during his visit to Perth, as his (Dr. Clark's) anaesthetist in a case of pneumonectomy for acute tuberculosis. The surgical result was excellent. In fact, Dr. Clark's results would convince Melbourne that the surgery of active tuberculosis was practicable. In reply to Dr. Marshall, Dr. Orton said that Overholt's posture and supports were so contrived as not to embarrass movement of the chest and diaphragm. In any event, he himself used "controlled" respiration in all such cases. Since the patient was not required to breathe for himself, the embarrassment caused by the supports ceased to be material. By "bronchial reflexes" Dr. Orton meant reflexes initiated by bronchial irritation and manifesting themselves in coughing. If one could abolish the effector response, one abolished the reflex for all practical purposes. Curare could be trusted to abolish the effector response.

SECTION OF MEDICINE AND SECTION OF SURGERY.

Symposium on Ulcerative Colitis.

A COMBINED MEETING of the Section of Medicine and the Section of Surgery was held. The meeting took the form of a symposium on ulcerative colitis.

A. W. MORROW (Sydney) discussed present concepts in ulcerative colitis. He said that non-specific ulcerative colitis might be defined as a disease or group of diseases of unknown aetiology, characterized clinically by diarrhoea (with the passage of blood at some stage), cramping abdominal pain, fever, anorexia, anaemia, asthenia and loss of weight. Remissions and exacerbations were frequent and unpredictable, and sigmoidoscopic examination usually revealed ulceration of the mucosa. At the present time it seemed that no one primary aetiological factor had been determined. Undoubtedly infection played a large part in the clinical manifestations of the disease, but it probably followed on some other factor which altered mucosal resistance. Emotional disturbances were undoubtedly concerned in exacerbations and relapses, and if they could be shown to be the causal factor in the production of excess lysozyme, then the disease might perhaps be regarded as primarily neurogenic. Dr. Morrow went on to say that clinically certain manifestations of

the disease were receiving more consideration recently. Segmental, regional and right-sided colitis was characterized by a progressive march to the left, until the whole of the colon might be involved; it lent itself to surgical short-circuiting procedures. Evidence had been adduced which seemed to indicate that ulcerative colitis in the majority of cases attacked the colon either partly or completely during the initial episode, and afterwards remained as a rule relatively stationary in distribution. The extent of the radiologically observed involvement was not directly related to the type of onset, the duration of symptoms or the clinical severity of the disease; sigmoidoscopic and stool examination were essential. A somewhat neglected systemic effect of the disease was hepatic dysfunction. Malignant degeneration was a danger to be remembered in connexion with any subject of ulcerative colitis. The main objects of treatment were control of symptoms, arrest of the inflammatory lesion and prevention of invalidism. No specific therapeutic measure was known, since no specific aetiological factor had been determined. Rest for the colon was the most important consideration. Ileostomy achieved it, but was unfortunately permanent. At the Royal Prince Alfred Hospital, Sydney, two other therapeutic measures had been tried with the object of resting the colon—total intravenous alimentation and medical ileostomy by means of a Miller-Abbott tube. The small amount of experience gained with the methods suggested that they might add considerably to the physician's armamentarium, although their scope was limited. In conclusion Dr. Morrow said that, although sound progress had been made in recent years, ulcerative colitis still defied science.

G. A. PENINGTON (Melbourne) referred to the clinical features, diagnosis and treatment of ulcerative colitis. He said that the clinical history and bedside examination of the patient with the aid of a pathologist established the diagnosis. With regard to the mode of onset, he said that ulcerative colitis might be insidious, acute, relapsing or fulminating. The clinical features were understood from the pathology of the disease and the lesions in the colon; but particular attention was given to the patient's personality, the presence of toxæmia, nutritional changes with anaemia, intestinal manifestations and local and remote complications. The personality of the patient differed from the average normal person to such an extent that the possibility of a psychogenic causation had been put forward. Certainly the patient's personality aggravated the disease, and the personality in turn was affected by a chronic disease. Toxæmia was always present, and was indicated by intermittent pyrexia, sweating, tachycardia, loss of weight, malaise, anorexia, headache and lesions remote from the colon. Emaciation was always present and might be extreme. Dietetic inadequacy was often an aggravating factor. Hypochromic anaemia and avitaminosis were partly due to disordered function and lesions of the mucosa. The chief intestinal manifestations were pain, diarrhoea and tenderness. Complications might be either local or remote. Local complications were pseudopolypoid, stricture, pericolic inflammation, adhesions, abscess, fistula, hæmorrhage, perforation and possibly carcinoma. Remote complications were polyarthritis, serous membrane lesions and thrombophlebitis. The course was variable and unpredictable; prolonged remissions occurred. Diagnosis was made by the exclusion of other conditions and by recognition of the characteristic features. The conditions causing difficulty were colon neurosis, chronic dysentery, infestations, specific inflammatory lesions, newgrowth, Crohn's disease, hæmorrhoids *et cetera*. Granular proctitis caused the greatest difficulty. Necessary diagnostic procedures included sigmoidoscopy (on which Dr. Penington laid special emphasis), careful consideration of the clinical history, examination of the patient, examination of his faeces and blood and radiography; as routine measures a test meal examination, tests for allergy, Wassermann and Mantoux tests and an X-ray examination of the chest should be made. Treatment in general was by chemotherapy, a suitable diet, blood transfusions, psychotherapy and symptomatic treatment as indicated. Ileostomy and colectomy might be necessary if the response to medical

treatment and to appropriate treatment for complications was inadequate.

A. E. COATES (Melbourne) discussed the surgical aspect of ulcerative colitis. He said that only at the request of the consulting physician was surgery undertaken. During the second world war many patients had died of perforation, hæmorrhage and toxic sequelæ of ulceration of the colon, the results of chronic untreated amoebic dysentery. In such cases ileostomy could be a life-saving measure. Dr. Coates referred to two of his cases in which ileostomy had made possible years of comfortable life. He then described in detail the surgical technique employed. The double-barrelled ileostomy, performed by the simplest technique, was considered the most suitable. A right lower abdominal incision was made, a point 12 to 18 inches from the ileo-caecal valve was chosen for the ileostomy, according to the condition, and a double-barrelled ileostomy was performed with a minimal amount of suturing. Tubes were tied in the cut ends of the ileum. Care of the skin was important; the gauze packing and tubes were removed at the end of forty-eight hours, and either a Hamilton Irving box or a rubber bag was applied. The ileal contents became pasty and semi-solid; whole colons had long ceased to carry out water absorption. Before ileostomy was attempted, clinical, biochemical, bacteriological, radiological and sigmoidoscopic investigations were necessary. During the months after the ileostomy further radiological and sigmoidoscopic examinations should be made; pathological changes might be progressing in the diseased colon. For a few months a gain in weight usually occurred; if there was then a recurrence of hæmorrhage and copious discharge *per rectum*, colectomy was indicated. Describing the technique of colectomy, Dr. Coates said that a formal colectomy was performed at present. Care was necessary in wrapping up the diseased colon as one proceeded. A stab wound was made in the iliac fossa, the stump of the recto-sigmoid and the stump of the ileum were laid side by side, and the tube was replaced in the end of the ileum. Gauze packing sealed off the wound and promoted adhesion formation. Sutures should not be put through infected bowel. The blood chemistry required attention. Resuscitation measures might be necessary. Crushing of the spur between the ileal and colonic stumps was carried out when the rectum was sufficiently healed, and then simple closure of the stoma was performed. Dr. Coates presented two cinematograph films illustrating the operations of ileostomy and colectomy and discussed a number of cases in his own practice. He stressed the importance of a close liaison between the physician and the surgeon; the care of the patient was a joint responsibility.

E. E. DUNLOP (Melbourne) read a paper entitled "Ulcerative Colitis: The Ileostomy Life". He referred first to some misconceptions concerning the difficulties, dangers and discomforts of ileostomy drainage; the procedure was variously stated to be objectionable on the grounds of continuous soiling with fluid faeces, disturbances of metabolism and nutrition, digestion of the skin, frequency of formation of abscesses and fistulae, and the incidence of strictures of the colon due to cicatrization following operation. The objections were shown to be largely without foundation. However, an ileostomy artificial anus in fact represented a serious inconvenience. Ileostomy should be advised only in cases in which the discomforts and dangers would be less than those of the disease. Dr. Dunlop considered that an ileostomy should be performed as an initial step in surgical treatment in the following circumstances: (i) failure of medical treatment associated with grave deterioration in fulminating, acute or chronic cases; (ii) the presence of serious complications—perforation (whether threatened or actually present), repeated hæmorrhages leading to severe anaemia, fistulae and sinuses associated with colon or rectum, stenosis and obstruction associated with extensive colitis, polyposis (pseudopolypoid) of the colon or rectum, and carcinoma of the large bowel (not infrequent in long-established ulcerative colitis with pseudopolypoid changes). In the absence of emergency, time should be spent in preparation of the patient for the operation. Dehydration, chloride depletion, anaemia and hypoproteinaemia should be corrected. Patients able to eat should take a suitable

diet. Chemotherapeutic agents were of value. Dr. Dunlop described the various types of ileostomy and the various problems in management that they presented; he showed a number of pictures to illustrate his remarks. He said that his preference was for the double-barrelled ileostomy through the right lower rectus muscle; it would usually permit colectomy to be performed in a single stage. If it seemed that the restoration of alimentary continuity would never be advisable, and early colectomy was planned, the divided loop ileostomy had merit. He described the technique of the procedure and the care of the patient in the early post-operative period. With regard to late management, he said that the cooperation of the patient was essential in the solving of minor individual problems, and in general the attitude of the sufferers was one of grateful acceptance of a state much preferable to that which preceded it. The essential features of a suitable ileostomy bag were accurate fit, avoidance of skin soiling and ease in emptying. These were best provided by the König-Rutzen type of bag, but other types, which were described, had their merits also. Restriction in the intake of "roughage" was essential for a few weeks after the operation. The patient soon learned which articles caused unfavourable reactions. After a few months usually no restriction was necessary. Relief from invalidism experienced by most patients produced a cheerful and vigorous attitude of mind; many were able to return to normal life. The mortality rates associated with ileostomy were largely determined by the condition of the patients prior to operation; the range was wide. Discussing restoration of continuity of the alimentary tract after ileostomy, Dr. Dunlop said that published results suggested that relapse occurred frequently, even under favourable conditions. In a disease so intractable, closure of an ileostomy was only occasionally advisable. In the present type of case colectomy was usually required, and sometimes excision of the rectum as well. If after colectomy the rectum appeared healed, ileo-rectal or ileo-sigmoid anastomosis might restore continuity. The period of "dysfunctioning" of the rectum should be prolonged, and restoration of continuity by crushing clamp method was much safer than by suture. Dr. Dunlop throughout illustrated his remarks with reports of a number of his own cases.

L. E. LE SOUEF (Perth) read a paper on the treatment of ulcerative colitis by appendicostomy. He divided surgical measures for treatment of the disease into two types, exclusive and adjuvant. Exclusive treatment was by means of ileostomy which excluded the large bowel from contact with the content of the small intestine, the hope being either to restore the mucosa of the large bowel by rest and then to close the ileostomy or to excise the colon and either to leave a permanent ileostomy or to carry out ileo-sigmoidostomy to restore anal function. Adjuvant treatment depended on appendicostomy by means of which various lavages, fluids, such as hypertonic saline solution, and medicaments, such as cod-liver oil, were more easily brought into contact with the mucosa of the colon which still functioned for the passage of intestinal content. Care was taken to ensure the giving of a diet with little residue, a high content of protein and calories and adequate amounts of vitamins B and C and of iron. Blood counts were made and transfusions of plasma or whole blood given as indicated. Six cases of treatment by appendicostomy were reported. Several of the patients had been under observation for ten years or more, and none had suffered a relapse. All still had functioning colons and all had a sense of well-being to which they constantly referred. None had shown signs of malignant changes. Dr. Le Souef made a plea for conservative treatment of ulcerative colitis and recommended the use of appendicostomy in all cases other than those associated with malignant changes or severe stricture.

G. A. KELSALL (Perth) read a paper on physiological considerations of electrolytic and protein balance in ulcerative colitis. He briefly outlined the function of the large intestine. He then discussed the metabolic disturbances associated with the disease and described the method of correcting them by intravenous medication. He concluded his remarks by putting forward a plea for the

use of conservative surgical measures in the treatment of ulcerative colitis.

H. STEWART (Perth) presented the details of a device to assist the patient with an ileostomy in the first few weeks. This was an adaptation of a colostomy comfort described in *The British Journal of Surgery* of some two years earlier. Dr. Stewart drew the details on the black-board and described something which resembled a supra-pubic tube with a smaller bore and a smaller outlet tube swaged at the side. It allowed the skin to remain healthy, and the ordinary ileostomy tube was substituted in three or four weeks' time when the ileal discharge thickened.

M. DAVIS (Melbourne) contended that the treatment of the condition was essentially medical, and an infective basis for it should not be presumed to exist. He described two phases of the condition. One was characterized by overaction of the bowel, neurogenic in origin; the bowel might be described as fibrillating. In the second phase, the structural changes occurred, but pathologically there was always an absence of inflammation. Dr. Davis asked whether that suggested a basis of a deficiency disease. Surgery had a place in the treatment only when structural changes had occurred; the main answer was probably preventive, but a possible psychogenic origin had always to be kept in mind.

A. J. COLLINS (Sydney) asked a question of Dr. G. Penington with reference to proctocolitis, whether colectomy was the treatment for this condition; and of Dr. A. E. Coates whether there was any given period for delay between ileostomy and colectomy.

G. Penington (Melbourne) replied that granular proctocolitis was characterized by a good nutritional state in the patient with no loss of general health. The patient might continue in his or her occupation; there might be hæmorrhages, but while the hæmorrhages caused alarm they did no harm. Anæmia was never gross as it was in ulcerative colitis. Therefore, in granular proctocolitis there was no indication for ileostomy in the first place or later for colectomy. Dr. Penington considered that surgery was indicated in ulcerative colitis when medical treatment had failed to maintain good nutrition or when retrogression had occurred because of toxæmia. On the question of appendicostomy, he considered that if it was intended to divert all matter from the infected colon, the diversion should be absolute. In his experience, saline solution had aggravated the colon. He considered that appendicostomy had no place in the treatment of ulcerative colitis; it was likely that improvements which had occurred after appendicostomy would have occurred without it.

A. E. Coates (Melbourne), in reply, congratulated Dr. L. E. Le Souef on the results of appendicostomy in the treatment of ulcerative colitis. He said that in Melbourne he had given up the procedure. He contended strongly that the condition should be treated by the physician and not by the surgeon. The physician asked for help from the surgeon only in certain late cases, often when the patient was in a serious condition. Then the surgical aid of ileostomy if possible, followed by colectomy, was invaluable. In reply to Dr. Collins, who had inquired the length of the delay between ileostomy and colectomy, Dr. Coates said that in some patients the ileostomy was permanent. It was not always possible to remove the colon. In other cases, if he had to indicate some time factor, he would say probably between six weeks and six months, the interval being required to put the patient into good condition.

L. E. Le Souef (Perth) said that he was delighted to hear from Dr. Davis that he thought that cod-liver oil injected into the colon was of great help because of its vitamin content; but he still maintained that the colon should be retained if at all possible. It had to be remembered that certain complications such as carcinoma would obviously demand colectomy. He was also glad to hear that many speakers confirmed the fact that the rectum's sigmoidoscopic appearance never returned to normal. Therefore, he still felt that ileo-sigmoidectomy would be followed by recrudescence of the disease.

SECTION OF MEDICINE AND SECTION OF PATHOLOGY, BACTERIOLOGY, BIOCHEMISTRY AND EXPERIMENTAL MEDICINE.

Symposium on Hepatic Disease.

A COMBINED MEETING of the Section of Medicine and the Section of Pathology, Bacteriology, Biochemistry and Experimental Medicine was held. The meeting took the form of a symposium on hepatic disease.

C. STANTON HICKS (Adelaide) discussed the physiological considerations relating to hepatic disease. He said that the liver, as the most important organ of intermediate metabolism, was greatly involved in disease. With the discoveries due to the use of isotopes, its place in the metabolism of protein and fat became clearer. Amino acids after absorption appeared to form aggregates indistinguishable from protein, but small enough to pass the cell boundary. They formed part of the "metabolic pool", and with prothrombin, fibrinogen, plasma protein and hemoglobin, were dependent for manufacture upon the normal function of the liver cells. When that was weakened through any cause, a high protein intake was indicated. The formation of lymph tissue depended upon the protein-synthesizing power of liver cells, and in turn produced the β -globulin of the blood which was the basis of immunity. Immunity was therefore impaired by faulty liver function. Conversely, the adverse effects upon liver tissue of toxæmia, infective or due to dietary deficiency, could be combated by diets rich in protein or by the use of protein hydrolysates. Methionine was the effective one of the component amino acids. It acted by providing a methyl group in the synthesis of choline, which in turn appeared to be necessary for the intermediate metabolism of fats in forming phospholipids. Choline was known to prevent fatty infiltration of the liver due to toxæmia; protein requirement was thus closely related to fat utilization. The use of carbohydrate to protect the liver against chloroform, carbon tetrachloride et cetera, thus appeared to rest on its protein-sparing property. Injection of the ketogenic fraction of anterior pituitary extracts caused fatty infiltration, owing to mobilization of depot fat. Lipocæic had no influence upon the process, which appeared to require intact suprarenal cortical function. In the special relation of vitamin K to prothrombin synthesis, and in the analogous relation of folic acid to the production of the maturation factor, the liver was inadequate if the cells were damaged. Quick's hippuric acid test and estimates of plasma protein content were more indicative than the bromsulphthalein and galactose tests. If damage due to the use of "Dicumarol" or salicylates caused hypoprothrombinæmia, the administration of vitamin K might not be enough; transfusion of blood was therefore required. Fibrinogen formation could also be adversely influenced by liver cell damage, and was another reason for thinking of the protein element in diet. Hyperinsulinism in liver disease, when the latter was not acute and obvious, should be sought by means of Quick's hippuric acid test, by estimation of the serum albumin:globulin ratio and by other tests; it should be treated by a diet rich in protein and carbohydrate, which gave protection against damage and enhanced recovery in cholangitis.

J. E. PERRY (Melbourne) read a paper entitled "Some Observations on the Pathology of Infectious Hepatitis and Allied Conditions", in which he first drew attention to the value of aspiration biopsy in the study of obscure liver abnormalities. He said that if the liver was the site of non-suppurative inflammation, then that inflammation might have all the variations of intensity and duration that characterized inflammations in other parts of the body, subject to the type of tissue involved. In epidemics of infectious hepatitis, the clinical and pathological features of acute yellow atrophy of the liver were found, indistinguishable from those seen in eclampsia or chemical poisoning. This acute yellow atrophy was one of a series of events that might take place in the liver when it was attacked by the specific virus of infectious hepatitis; in that disease it represented the extreme lesion, but fortunately it was rare. When liver damage was less

severe and the patient lived, surviving liver cells proliferated and gave rise to nodules of liver tissue surrounded by connective tissue which ultimately became condensed. Multiple nodular hyperplasia resulted, and it was thought likely to be the precursor of portal or Laennec's cirrhosis. Naturally, not all portal cirrhosis was the end result of infectious hepatitis. Rather, the picture was one of a virus infection producing acute, non-suppurative inflammation, which might have subacute and chronic manifestations of variable intensity, so that the end result might be portal cirrhosis, better termed chronic non-suppurative hepatitis. The occurrence of infectious hepatitis in early life brought another disease into the differential diagnosis of jaundice in the period when hæmolytic anæmia and obliteration of the bile ducts manifested themselves. The problem of fat in the liver was formidable; it resulted from a wide variety of causative agents, ranging from phosphorus poisoning to amino acid or vitamin deficiency. In the production of fat accumulation in the liver, starvation, choline or methionine deficiency and toxæmia might have played their various parts, and that had to be appreciated by the physician. He should not be blinded by the one obvious common factor—infection. Dr. Perry reported in detail two cases to illustrate his remarks.

K. STUART HETZEL (Adelaide) read a paper on the clinical value of liver function tests. He said that liver function tests were performed for three reasons. (i) They were a help in the differential diagnosis of jaundice, in separating "medical" from "surgical" cases. (ii) In the detection of latent liver damage and in the diagnosis of liver enlargement they were of value. (iii) In the detection of hepatic insufficiency they were performed as an aid to prognosis and in the directing of treatment. Liver function tests could never replace a well-taken history and a carefully conducted physical examination, and they should not be expected to do so. Dr. Hetzel stressed the need to perform several liver function tests covering a number of the different functions of the liver. The tests should not be expected to act as a short cut to a diagnosis. He then discussed the following tests from the point of view of their value and limitations: (a) tests for urobilinogen in the urine, (b) flocculation tests, (c) estimation of the serum protein content, (d) estimation of the serum alkaline phosphatase content, (e) the galactose tolerance test, (f) estimation of the plasma prothrombin content, (g) the bromsulphthalein clearance test, (h) the hippuric acid excretion test. The results in ten typical cases of hepato-biliary disease were stated. Dr. Hetzel stressed the fact that, even if the tests did not help in the diagnosis, they would give a better insight into the pathological process involved, supplying information which was obtainable in no other way and which would help in the management of the case.

A. W. MORROW (Sydney), in opening the discussion, said that Sir Stanton Hicks had provided in his usual exemplary manner the composite correlated picture of the dynamic equilibrium of protein metabolism. Dr. Perry's clear exposition of the pathology of infective hepatitis was exemplary. Dr. Morrow wished to ask him two questions. First, could he by means of liver biopsy give any indication of the prognosis in infectious hepatitis? That condition was a grave malady, and one of the great difficulties was that clinicians were less aware of the possible grave sequelæ owing to the fact that the patient might be in apparently good health when actually he was suffering from progressive cirrhosis of the liver. In nephritis the grave sequelæ were well known, and examination of the urine would indicate the presence of a smouldering lesion; but in hepatitis no such simple test was available. It was important to attempt to determine whether the patients had been handled properly during the acute stages of their illness and to estimate the present state of liver function in order to safeguard against further damage to the liver. Secondly, he desired to know whether infectious hepatitis was a single entity or due to a variety of causes.

Dr. Morrow considered that Dr. Hetzel had put the position with regard to tests of liver function very clearly, but he (Dr. Morrow) wanted to know whether serial tests had been performed, because it did appear that

one group of tests performed on only one occasion were of little value in diagnosis. Serial tests could possibly be of some value, not only in diagnosis, but also in prognosis. He wished to know which tests of flocculation had been performed. At the Royal Prince Alfred Hospital it had been found that cephalin flocculation tests were not very satisfactory, and for that reason the colloidal gold and thymol flocculation tests were preferred. He wondered whether those tests, and particularly the last-named, were not possibly too sensitive, in that a positive response resulted when the patient was apparently well. The galactose tolerance test had not been used owing to difficulty in obtaining galactose, but another test of carbohydrate metabolism had been used—namely, the intravenous glucose tolerance test; it had not been of any value. The hippuric acid elimination test had been shown to be of no value because it was coarse and subject to external influences, and was often erroneous and misleading. Estimation of serum protein was of value, but the serum protein level altered only when the disease was severe, and it had been found difficult to obtain reliable figures—when two departments estimated the protein content of the same specimen of serum at the same or approximately the same time different estimates had been returned. The evidence that the serum alkaline phosphatase content was raised in carcinoma of the liver might be of considerable value in a case of jaundice in which evidence regarding the cause was lacking. Dr. Morrow requested guidance on the importance of nutritional factors in prognosis and on the significance of the biopsy test and tests of liver function in that regard.

A. J. COLLINS (Sydney) said that prognosis in hepatitis was the bugbear of the physician. That was due to the fact that structural damage of the liver pointed to future trouble, and whereas in lesions of the kidney, functional tests were of considerable value in estimating the probable course of the disease, no such comparable tests were available in estimating liver efficiency. In disease of the liver it appeared that prognosis should be based more particularly on the results of biopsy of the liver. Considerable anxiety was inevitable when puncture of the liver showed changes of significance; but that method was probably the only means by which progress could definitely be indicated. Tests of liver function still had many anomalies, but some progress was being made. Serum phosphatase estimations could be misleading when obstructive jaundice was present.

H. KRETSCHMAR (Perth) said that as a biochemist he would like to comment on the tests of liver function. If urobilinogen was absent from the urine, that fact was indicative of complete obstruction. Positive results to flocculation tests were due to different mechanisms, the cephalin flocculation test being due to presence of γ -globulin and the thymol turbidity to β -globulin. The advantages of the thymol test were that the material was readily obtainable and the reagents were simply applied. The colloidal gold flocculation test had been shown by MacLagan to agree with the thymol turbidity test. If flocculation did occur with those tests, the presence of liver damage was indicated; but that damage was not necessarily due to a primarily cellular lesion, because obstruction to biliary outflow resulted in cellular damage, and on the other hand damage to the hepatic parenchyma resulted in obstruction. He agreed that the thymol tests often gave positive results for a long time after apparent recovery. He did not consider that the albumin-globulin ratio provided much help, and thought that there was considerable overlapping in serum alkaline phosphatase values. He had had no experience with the galactose tolerance test and was of the opinion that hippuric acid elimination was of value only in the late stages of disease of the liver.

DOUGLAS THOMAS (Melbourne) said that it was important to bear in mind the great importance of disturbance of vascularity in causing hepatic impairment. Constrictive pericarditis provided an outstanding example of the effect of disturbed circulation on liver function. He mentioned two examples of that condition. One occurred in a young man who obtained apparently complete relief as a result of operative intervention. The other case was that of a

woman, aged fifty-eight years, who, although she survived the operation, obtained no great degree of improvement because of the presence of severe capsular fibrosis; that condition had been revealed in a specimen obtained at biopsy.

J. K. MADDOX (Sydney) said that considerable work was in progress regarding the state of the serum proteins in constrictive pericarditis, and that it was probable that useful information would be forthcoming. The work was of paramount importance because of the necessity for accurate prognosis. He wished to know whether there had been any correlation between the results of tests of function and the findings on biopsy studies. Bromsulphthalein dye absorption was not a popular test in Australia, but Dr. Maddox thought that it would be advisable for it to be used as a test of liver function. Of practical importance was the fact that despite laboratory assistance laparotomy was often necessary in order to determine the underlying lesion in many cases of damage to the liver. He considered that quantitative estimation of urobilinogen was of value, that the hippuric acid test was misleading, and that estimation of prothrombin was a coarse test. He urged that the introduction of electrophoretic apparatus should be strongly supported.

GEOFFREY PENINGTON (Melbourne) expressed the opinion that much of the difficulty in the interpretation of tests of liver function was attributable to the fact that the liver had such a wide margin of reserve before evidence of dysfunction was apparent that tests of necessity yielded positive results only when damage was extensive. It was not known in many cases how sensitive the tests were to disturbance of function, and it did appear to him that correlation of two or more tests, as had been used by MacLagan, would probably provide much more useful information than had so far been obtained. He agreed with Dr. Morrow that the great problem was the determination of the presence of residual changes following infective hepatitis, and that until such time as satisfactory sensitive tests could be employed, it was necessary to be guarded in the interpretation of the value of such tests. He asked that in his reply Sir Stanton Hicks should comment on the mode of action of "Dicumarol" in lowering the prothrombin content of the blood, and also that Dr. Hetzel should indicate whether the determination of prothrombin referred to the prothrombin index or the prothrombin content of the serum. Dr. Penington was of the opinion that it took more than twenty-four hours for vitamin K to affect the prothrombin content of the serum, and he asked for information regarding the dose of vitamin K which had been used by Dr. Hetzel in determining its effect in increasing the prothrombin content. The reason for asking the last question was that when it was desired to raise the prothrombin content of the serum of a patient who had been receiving "Dicumarol", large doses of vitamin K (60.0 to 75.0 milligrammes) were necessary, and that it was usually a matter of about forty-eight hours before the effect was noticed.

C. Stanton Hicks (Adelaide), in reply, stated that he was of the opinion that "Dicumarol" acted at the point at which vitamin K entered into the synthesis of prothrombin. In order to understand that, the cellular proteins should be visualized as systems in which the protein was continually changing, and in which the ratio of the contents of the stream determined the quality of the individual protein system. The elements of the dynamic structure of the cellular protein were continually being replaced from the pool of available elements, and any distortion of the proportions of the contents of that pool would have a corresponding effect on the cellular protein, although such a change or changes might be slow. In degenerative diseases increased distortion was often attributable to distortion of the stream of alimentation. For that reason he had been particularly interested in Dr. Perry's statement that the taking of milk had resulted in improvement in the state of the liver when the administration of methionine and choline had failed so to do. Tests of liver function covered only small areas of a large field, and the physiologist was required as an onlooker to assist in the synthesis of all factors of value. Nutrition was a dynamic state, and degenerative diseases

resulted from disturbances which often were not suspected. As evidence of that observation, Sir Stanton Hicks described a girl who had been brought to him by a dentist and was suspected to be suffering from fluorosis. She had been living at Glenelg, where there was in fact a low fluorine content of the water; but she had been consuming in the vicinity of 12 litres per day of the water, thus providing an adequate reason for the dental manifestations of fluorosis.

J. E. Perry (Melbourne), in reply, said that Dr. Morrow's questions were pertinent and therefore necessarily rather difficult to answer. The prognosis in non-suppurative hepatitis was always difficult. Patients with infectious hepatitis appeared to make a recovery in six to eight weeks in 90% of cases, and at the Royal Melbourne Hospital it was considered that if at the end of four months the patient was still ill, the diagnosis of chronic hepatitis was justified. Biopsy was of only little assistance, because the duration of experience with that method of examination was not long enough. It was quite unknown why there should be an indwelling virus which was self-reproducing, as was apparently the case in that condition. However, Dr. Perry could remember a patient who had died at the age of eighty-six years after acute appendicitis, and who was found at autopsy to have cirrhosis of the liver apparently due to virus infection at an indefinite earlier period, there being no history of the initial illness. He could not definitely state whether all that group of conditions was due to one virus. In many instances epidemic conditions suggested indefinite diagnosis; but in other instances the clinical presumption of virus infection had to be made. He had been informed that chick embryos had been successfully inoculated with the virus in America. He agreed with Dr. Maddox that hippuric acid elimination was defective only in severe degrees of liver failure, and that bromsulphthalein should be used more frequently and that it was especially indicated in children.

K. Stuart Hetzel (Adelaide), in reply to Dr. Morrow's question, said that the flocculation tests used were the colloidal gold and cephalin flocculation tests, which were usually employed together. Sometimes the results disagreed. He considered the hippuric acid test was not satisfactory, particularly because of the unknown factor of renal metabolism. It was difficult to give any prognosis on the result of the tests, which were of no use in that respect in the early stages; but he was of the opinion that the estimation of the serum albumin content was of use especially if less than 2% was present. The prothrombin response to injection of vitamin K was considered by him to be an indication of what was happening in the liver. He agreed with Dr. Penington that the correlation of tests was necessary, and considered that the tests which were of greatest value were the estimation of urobilinogen in the urine, flocculation tests, the estimation of the serum alkaline phosphatase content and the estimation of the prothrombin content. The alkaline phosphatase content could be considered as indicative of obstruction only if the result was very high. He thought that the bromsulphthalein test was of particular value if no jaundice was present. The dose of vitamin K given to increase prothrombin content was 20.0 milligrammes. The galactose tolerance test had given discordant results and was of greatest value in thyrotoxicosis.

SECTION OF MEDICINE, SECTION OF OPHTHALMOLOGY AND SECTION OF NEUROLOGY AND PSYCHIATRY.

Myasthenia Gravis.

A COMBINED MEETING of the Section of Medicine, the Section of Ophthalmology and the Section of Neurology and Psychiatry was held to discuss *myasthenia gravis*.

FRANK B. WALSH (United States of America) read a paper on the diagnosis and treatment of *myasthenia gravis*. The first part of the paper, which dealt with diagnosis, was

based on observation of 125 cases of the disease and was illustrated with reports of cases of particular interest. The second part was concerned with treatment, but only with regard to its ineffectiveness in "ocular" myasthenia and the present status of thymectomy. Summing up the conclusions from the paper, Professor Walsh said that the pathogenesis of *myasthenia gravis* remained obscure. To diagnose the disease correctly a knowledge of the ocular signs was a necessary prerequisite, and concerning these the following principle of diagnosis was offered. In cases in which the condition was characterized by external ophthalmoplegia, if a diagnosis other than *myasthenia gravis* was not crystal clear a diagnostic injection of neostigmine was indicated. Atropine should never be omitted. Response to neostigmine was variable and required experienced observation in some cases. A response, if it was pronounced and reproducible, almost certainly indicated the diagnosis of *myasthenia gravis*. In rare instances the individual with *myasthenia gravis* might be essentially neostigmine-resistant. Professor Walsh pointed out that a response to neostigmine might be obtained in subjects of conditions other than myasthenia—bulbar palsy, amyotrophic lateral sclerosis, muscular dystrophy, congenital ptosis—but that such responses were weak and, at least in the condition last named, were not reproducible. He referred to a possible relationship between *myasthenia gravis* and hyperthyroidism which might ultimately be elucidated. Discussing treatment, Professor Walsh said that for ocular symptoms neostigmine, except in occasional instances, was unsatisfactory. With regard to thymectomy, it was established that the operation had real value in some cases. Indications for its performance were, however, not clear and urgently required further study.

K. B. NOAD (Sydney), in opening the discussion, said that they were all grateful to have Professor Walsh present to give them the benefit of his experience in subjects such as that under discussion. That experience had been increased by the number of patients who had been attracted to the Johns Hopkins Hospital, which, with the Mayo Clinic and the two American medical centres, was most widely known outside that country by the fame of the great surgical pioneer Blalock, who in 1936 was the first surgeon to perform thymectomy successfully and to put the operation on a sound surgical footing. Before that approach had been made through the neck and the results had been invariably fatal. It was difficult to speak on a subject so wrapped in mystery, and Dr. Noad was of the opinion that the disease under discussion constituted one of the most intriguing and challenging problems in clinical medicine of the day, so much about the condition was vague and uncertain, and experience from various centres had been so contradictory. Dr. Noad considered the one sure rock on which all could rest was the unflinching effect of "Prostigmin" in the disease, and Professor Walsh was of the opinion that some patients might be "Prostigmin"-resistant, which was bad news and made confusion worse confounded. Up to the present "Prostigmin" had been regarded as a cholinesterase inhibitor. Speaking of the effects of "Prostigmin" in conditions other than *myasthenia gravis*, Dr. Noad said that he had seen it improve the condition of a patient with bulbar involvement in diphtheritic polyneuritis and in bulbar forms of progressive muscular atrophy. Professor Walsh had quoted the dictum of Viets that swallowing had never improved in any condition other than *myasthenia gravis*, and Dr. Noad was of the opinion that many would hesitate to join issue with Henry Viets; but the fact remained that significant improvement had occurred in swallowing in the case of diphtheritic polyneuritis already mentioned, and the drug had in fact tided the patient over a bulbar crisis. Dr. Noad agreed, however, that the effect appeared to diminish progressively; the drug had failed to save the patient in a later crisis. Professor Walsh had mentioned previously the list of conditions which might be mistaken for myasthenia, one being neoplasm of the brain stem. Dr. Noad endorsed this and quoted the case records of two patients at Queen's Square in the pre-"Prostigmin" days who were considered to be myasthenics; he described how

at autopsy neoplasm in the region of the brain stem had been found. One of the patients, a young woman, had been under observation for twelve months and had exhibited the most remarkable remissions in her symptoms.

Dr. Noad considered that any discussion of myasthenia inevitably came round to the thymus gland. He referred to a leading article in *The Lancet* in 1942 that had given an apt description of the enigma. It had stated that the thymus gland had remained an enigma, that endocrinologists had wooed it in vain, that the physiologist and the pathologist had drawn away from it baffled, and that even the anatomists and histologists had not spoken of it with their customary precision. Dr. Noad expressed the opinion that it was certainly an enigma in the disease under discussion and that there were no means of determining which patients would benefit by its removal. He personally had followed the Mayo Clinic dictum of recommending operation only for patients who appeared to be slipping and who required increasing quantities of "Prostigmin", as in those cases in which a tumour had been demonstrated. Dr. Noad considered that the hyperplastic gland was not demonstrable radiographically, but that the thymic tumour often was demonstrable only in oblique or lateral views. Dr. Noad referred to three cases of malignant thymic tumour which he had encountered; two of the patients suffered from myasthenia, and he thought that it was only right that those tumours should be removed, especially if some relief of the myasthenia might follow. Once again conflicting reports had been encountered, and Meynes, with Harvey in agreement, had been of the opinion that his myasthenia patients with tumour had fared badly. On the other hand, Dr. Noad remarked that in reference to their series of 32 cases, including 14 tumours, Eaton and Clayett, of the Mayo Clinic, had stated that the results after tumours had been removed were very much better than those obtained after the removal of hyperplastic glands. He had records of only seven patients who had undergone thymectomy; two had died—one had a malignant tumour and one died suddenly a few days after operation. In two cases good results were obtained, and one patient, who was severely ill, suffered from a psychotic episode requiring electro-convulsive therapy after operation. That patient now required no "Prostigmin", whilst the one patient operated upon recently had shown satisfying post-operative improvement and had required only one-fifth of her pre-operative "Prostigmin" dosage. That patient was a young woman with a short history, and the prognosis in her case was said to be better. Three of the patients had had tumours, but had been improved by operation. Large amounts of "Prostigmin" had been necessary before and after operation. In conclusion, Dr. Noad said that he hoped there would be a discussion on that point, as it opened the only positive line which might be taken in treatment.

L. B. Cox (Melbourne) expressed his gratitude to Professor Walsh and regretted that he had only 30 cases to which he could refer, in contradistinction to the large number that Professor Walsh had observed. He wished to make particular reference to remissions and to refer to two cases in particular. In the first of them the patient, who had received "Prostigmin" therapy for one to two years, was lost to view for many years until he reported at the age of seventy-five years with his daughter, who, incidentally, was suffering from disseminated sclerosis. During the intervening period the man had been able to give up "Prostigmin" and to assist with moderately hard physical work on a farm. The second example was in relation to disease of the thyroid gland. The patient had been suffering from myasthenia for one or two years, but after removal of an adenoma of the thyroid gland had remained well for seven or eight years. Thereafter, however, "Prostigmin" was required and benefit was derived from its administration. Dr. Cox had had experience of only one case in which operation was performed. He asked Professor Walsh whether any effect had been obtained from local intramuscular injection of "Prostigmin". He (Dr. Cox) had used it in the treatment of one patient who had suffered from sudden ptosis causing actual closure of the eye after he had undergone an

examination. No benefit had been evident in that case, but an ordinary systemic injection produced a good result.

L. H. HUGHES (Sydney) reported a child, aged two years and nine months, who had been referred to him from the ophthalmological department because of double ptosis. A tumour of the brain stem had been suspected, but the patient developed dysphagia and regurgitation of fluid through the nose, a diagnosis of *myasthenia gravis* being then suspected. "Prostigmin" and atropine were injected with benefit, and this effect was repeated. The child had been given "Prostigmin" for a period of four years and appeared as a result to be normal. Dr. Hughes said that his chief reason for reporting the case was the unusually early age of the patient. He had not considered thymectomy in that case.

Frank B. Walsh (United States of America), in reply, agreed that "Prostigmin" resistance was very interesting and very rare. He referred to the use of difluorophosphate, which destroyed cholinesterase, but deprecated its use because of its dangerous side-effects. The response of diphtheritic polyneuritis to "Prostigmin" as reported by Dr. Noad was of interest, because it supported his own contention that benefit from "Prostigmin" was not restricted to *myasthenia gravis*; but it was against the findings of Viets. He (Professor Walsh) had seen remissions with and without the administration of "Prostigmin", and he agreed that the position of the thyroid gland in the disease still required elucidation. He had not used "Prostigmin" locally, in the manner mentioned by Dr. Cox. The youngest patient whom he had seen suffering from the disease was aged three years—the patient to whom he referred during the course of his lecture. The occurrence of the disease in children was remarkable. Professor Walsh referred again to the question of thymectomy in order to clarify his own attitude to this operation. He would not advocate it as a procedure to be performed in every case, but would agree to the operation's being performed on those patients desiring it, because it was only by means of a careful study of further results that the position of the operation as a therapeutic measure could clearly be defined. However, so long as patients were going along nicely on "Prostigmin", he would let them keep their thymuses.

SECTION OF NEUROLOGY AND PSYCHIATRY AND SECTION OF OPHTHALMOLOGY.

Intracranial Aneurysms.

A COMBINED MEETING of the Section of Neurology and Psychiatry and the Section of Ophthalmology was held to discuss intracranial saccular aneurysms.

FRANK B. WALSH (United States of America) discussed the ocular signs of intracranial saccular aneurysms. He divided intracranial aneurysms into arterio-venous aneurysms and saccular and fusiform aneurysms. Saccular aneurysms might be classified as to etiology as (i) military aneurysms which, situated on smaller vessels, were usually in the substance of the brain, (ii) mycotic aneurysms, which arose as the result of deposition of septic emboli, (iii) post-traumatic aneurysms, (iv) atheromatous aneurysms and (v) congenital saccular or "berry" aneurysms, with which the paper was particularly concerned. Professor Walsh described the symptoms and signs of intracranial arterial aneurysms and pointed out that saccular aneurysms provided ocular signs which were of value in topical diagnosis. These ocular signs were discussed in detail in relation to each important site of occurrence of aneurysms, case histories being recounted by way of illustration. Subclinoïd or intracavernous aneurysms usually did not account for changes in visual acuity or visual fields; they characteristically produced ophthalmoplegia and involvement of the trigeminal nerve. Supraclinoïd aneurysms, for example, those arising on the carotid trunk beyond the cavernous sinus, from the junction of the posterior communicating artery and the carotid, and from the anterior cerebral and the anterior communicating arteries, had produced unilateral loss of

vision, paracentral and junction scotoma and bitemporal hemianopsia. Posteriorly situated aneurysms had produced sixth nerve palsies, cerebellar signs and choked optic disks. Aneurysms involving the optic radiations produced hemianopsia. Those arising from any vessel in the circle, excepting possibly the anterior cerebral and anterior communicating arteries, might press upon the optic tract; non-congruous hemianopic defects had been observed in the visual fields of several individuals who suffered from aneurysm.

Professor Walsh described the possible surgical procedures in treatment and went on to discuss interesting points in anatomy and physiology which had been brought to light by a study of the ocular signs of aneurysm. Descriptions were given of the regeneration phenomenon of the third nerve, the collateral circulation between branches of the external and internal carotid arteries and sensitization to acetyl-choline following denervation.

LEONARD B. COX (Melbourne), in opening the discussion, said that when he had been asked to speak at the meeting he realized that he had not put in order his own ideas on the subject. He went into the histories of a series of patients suffering from intracranial aneurysm from the Alfred Hospital, numbering 75, most of whom had been under his own care. Of the 75 aneurysms, 22 had produced significant paralysis of ocular muscles, which was a little more than 30%. Dr. Cox said that after reading Geoffrey Jefferson's article he had been impressed by the topographical syndromes described. Of the 22 cases of nerve involvement, in 21 paralysis of the third nerve had been present, in one the fourth nerve alone was involved, and in only one was the sixth nerve implicated. Incidentally, in only one case was the fifth nerve involved. The fifth nerve had invariably been tested, but not in every case was it possible to be certain of analgesia as the patients had frequently been confused; but he had been looking especially for involvement of the fifth nerve since and had found it in only one case. Autopsy had been carried out in eight cases by Professor R. A. Willis; the third nerve was involved alone in those cases, and at post-mortem examination the aneurysm was found on the internal carotid artery in three cases, on the anterior cerebral artery in two and on the posterior cerebral artery, the ophthalmic artery and the middle cerebral artery in one each. Dr. Cox said that recovery of function in the nerves affected had been poor. He had never seen recovery of upward movement, and only occasionally had downward movement shown partial recovery. Dr. Cox cited the case of a man in whom aneurysm of the posterior communicating artery had been diagnosed by "Diodrast" injection. In that case the carotid artery had been tied after very slow compression taking two hours. Unfortunately, eighteen hours later hemiplegia had developed with disastrous emotional consequences. The man had since recovered some power of upward movement. He had not often seen any appreciable degree of recovery of the pupil. Dr. Cox said that he dreaded the operation of carotid ligation, because twice he had seen delayed onset of hemiplegia, in one case after eighteen hours and in the other after sixteen. There had been another case at the Alfred Hospital in which hemiplegia occurred twenty hours later. He felt that it was a procedure which should be carried out only as a life-saving measure and for the relief of pain. Dr. Cox also mentioned the case of a patient who had had pain of fifth nerve distribution for seven years and after six years had developed diplopia. This patient had had practically every movement of the eye involved, and also had analgesia of the first division of the fifth nerve and hypalgesia of the second division. The visual acuity was reduced and proptosis of the eye was present with bulging of the temporal bone and asymmetry of the zygoma. A diagnosis of meningioma of the sphenoidal ridge had been made. On X-ray examination some calcification had been seen, with formation of a crescent behind the pituitary fossa which perhaps should have led to a suspicion of aneurysm; but erosion of the greater and lesser wings of the sphenoid was present, which was rare in aneurysm. At operation Dr. Hugh Trumble had cut into the tumour for the purposes of proving the diagnosis, and clot had emerged.

GERALD MOSS (Perth) expressed his indebtedness to Professor Walsh, and agreed that it was impossible to cover all aspects of the subject; he wondered that Professor Walsh had not mentioned the ocular hemorrhages present after rupture of berry aneurysms. Riddock and Goulden had discussed these hemorrhages extensively in 1923. They thought it remarkable that all anterior aneurysms were not associated with them after rupture, but they postulated that the optic sheath was probably sealed by previous hemorrhages. Dr. Moss had found that two American writers had described a similar process and the production of ocular hemorrhage by compression of the ophthalmic vein. Dr. Moss thought such hemorrhages in the retina were of great diagnostic value, and in one case had enabled the diagnosis to be made when it was thought that cerebral tumour was probably present. Speaking of carotid ligation, Dr. Moss cited the case of a very "tough" man, aged sixty-eight years, who had had excruciating pain in the first and second divisions of the fifth nerve for two months with complete third nerve paralysis. In that instance hyperæsthesia had been present instead of analgesia. The internal carotid artery had been tied and the pain had immediately disappeared, with partial relief of ptosis, and a year later the man was still well. Dr. Moss said that he had since heard of successful ligation in a patient aged seventy-two years.

J. A. McCLUSKIE (Perth) cited the case of a man attending the Repatriation Department clinic. He had had a carotid ligation performed during the war by army surgeons. The man's general condition was excellent; he had no abnormal physical signs and no psychiatric disturbance. After ligation the bruit had completely disappeared; thus no doubt the case was one of carotid cavernous communication.

E. BEECH (Perth) asked Professor Walsh what were the results of clot evacuation after aneurysmal rupture.

P. C. C. TRESIZE (Perth) asked what was the quality of the pain and its site.

G. H. BARHAM BLACK (Adelaide) said that, in common with most ophthalmologists, he had seen a number of patients with intracranial aneurysm over a period of years, mostly in cooperation with a neurosurgeon, and some had been treated successfully by operation. One case, however, had had unusual features which he thought worthy of mention. A man, aged about thirty years, was examined at Bristol in 1931, and his case had already been reported in THE MEDICAL JOURNAL OF AUSTRALIA a year or so later. The presenting symptoms and signs were pain, throbbing in nature and occurring only in the recumbent position, together with impaired visual acuity in the left eye. The left optic disk was pale and there was a left nasal field defect. A presumptive diagnosis of intracranial aneurysm was made; but the patient left the Bristol Eye Hospital and was not seen there again. It was subsequently found that he had been operated upon by an ear, nose and throat surgeon in a neighbouring hospital for supposed sphenoidal sinusitis, the aneurysm had ruptured and he had died at once. The brain had been obtained; examination revealed a large saccular aneurysm starting from the junction of the left anterior, central and anterior communicating arteries. The fundus of the sac had pressed backwards on the antero-medial surface of the left optic nerve, and the anterior central artery had thereby been tightened around the posterolateral portion of the nerve with the resultant nasal field defect.

F. B. WALSH (United States of America), in reply to Dr. Cox, said that his experience corresponded fairly well with Australian experience—namely, that sixth nerve involvement was infrequent. It occurred only with posterior aneurysm, except in cases of complete ophthalmoplegia when the aneurysm was in the cavernous sinus. Hemiplegia after ligation of the internal carotid artery occurred in all series, but was not common in younger people. Referring to Dr. Moss's remarks, Professor Walsh said that Keith and Wagener were the two Americans to whom he had referred. They had described ocular hemorrhages of the prehyaloid type; but he had not seen such hemorrhages in more than 25% of his cases. He considered that Dr. Moss's view of the method of production

of such hæmorrhages was correct—by venous compression. Professor Walsh had gone into the question of the membranous sheaths surrounding the optic nerves. He had found that the subarachnoid and subdural spaces were potential spaces only, and in subarachnoid hæmorrhage the blood was found in the subdural space in some cases. He could not explain how that occurred. Professor Walsh said that all large hospitals had had their tragedies with sphenoidal sinus operations, at which an aneurysm had been opened. Referring to the evacuation of clot, he said that at one time Dandy and Ford had held that evacuation of intracerebral clot was not a sound procedure; but he thought that their view had now changed and that in some cases it might be a sound procedure, but how frequently it had been performed at the Johns Hopkins Hospital he could not say. As to the type of pain, it might be terrific, cutting, burning, tearing, and often inconstant, but lasting for hours in some cases. It could not possibly be mistaken for tic. The site of the pain in his cases had been in the vicinity of the eye, in the frontal and temporal regions.

SECTION OF ORTHOPÆDICS AND PHYSICAL MEDICINE AND SECTION OF RADIOLOGY AND RADIOTHERAPY.

Symposium on Osteoarthritis.

A COMBINED MEETING of the Section of Orthopædics and Physical Medicine and the Section of Radiology and Radiotherapy was held. The meeting took the form of a symposium on osteoarthritis.

R. D. MCKELLAR HALL (Perth) presented a brief survey of the treatment of osteoarthritis of the hip, a short *résumé* of the situation beginning with the work of Tubby in 1912. He said that at that time conservative treatment was carried out on much the same general lines as at the present time. When a patient suffering from osteoarthritis of the hip joint presented himself it was necessary before planning any course of treatment to obtain much information apparently unrelated to the condition of the hip joint; the patient must receive more attention than the disease. It should also be remembered that patients presented themselves as a rule with a complaint of pain and not because of the restricted mobility of the hip joint; therefore it seemed better to concentrate on the problem of relieving the pain rather than on the more spectacular but much less certain chance of restoring painless movement in the hip joint. Treatment could be divided into conservative and operative measures. Dr. McKellar Hall then went on to discuss briefly the conservative measures advocated by Tubby, all of which were still applicable, and modern additions to them. He also referred to the various operative procedures available and their scope and indications. He concluded his remarks by saying that the solution of the problem was not yet entirely in sight, and by expressing the hope that the future would show the way to a more permanently bright outlook for patients afflicted with osteoarthritis of the hip.

B. G. WADE (Sydney) dealt with the treatment of osteoarthritis of the hip by physical measures. He said that although the condition could not be cured, much could be done by physical measures to relieve pain and improve walking. The following general measures were outlined: (i) Bad posture which produced faulty weight distribution should be corrected by exercises. (ii) Working conditions should be investigated and modified or altered when necessary. (iii) Exercises should be regulated and a rest period of one hour a day insisted on. The application of extension might be of value. (iv) Obesity if present should be corrected by a suitable diet and possibly supervised administration of desiccated thyroid. The following local measures were then described: (i) Injections of procaine into myalgic spots might relieve muscle spasm and fibrositis. (ii) Powerful reinforcement of the blood and lymph supply could best be accomplished by the administration of short-wave therapy for twenty to thirty

minutes at the maximum tolerated by the patient. (iii) Counter-irritation over the joint could be produced by histamine iontophoresis or by playing a shower of fine sparks over the area from a vacuum electrode connected to the Oudin terminal of the long-wave diathermy machine. It was best to change from one method to the other and back again. (iv) If the pain and flexion deformity did not subside, a plaster spica could be applied to the hip. Dr. Wade then said that next to short-wave diathermy massage was the treatment *par excellence*. He finally described suitable non-weight-bearing exercises designed to overcome the flexion deformity.

F. DUVAL (Sydney) read a paper on the treatment of ankylosing spondylitis and osteoarthritis. He referred particularly to the value of deep X-ray therapy in the treatment of ankylosing spondylitis, osteoarthritis and subdeltoid bursitis. He said that in ankylosing spondylitis the response depended upon the stage at which treatment was given. If the lesion was treated early, restoration to normal could be hoped for; if the lesion was advanced and ankylosis had occurred, little could be achieved except relief of pain, which was by then rarely severe. Dr. Duval described a method of irradiation in which 200 kilovolts were used, filtered through one millimetre of copper and one millimetre of aluminium. It appeared that the best results followed irradiation of the entire spine in the early case. In the later stages treatment should be given only where symptoms occurred. Irradiation had to be combined with orthopaedic care if the best results were to be obtained. In osteoarthritis X-ray therapy gave variable results. Many painful joints could be made almost symptomless, but it was difficult to predict what the response would be. Moreover, improvement was often only temporary. However, the method was simple and caused little inconvenience, and the percentage of good results was high enough to make it worth using. In acute subdeltoid bursitis, deep X-ray therapy brought about rapid restoration to normal with a minimum of disturbance of the patient. Frequently only one or two treatments were necessary to afford complete relief of symptoms within a few days. The subacute type was relieved rather more slowly, but the results were still excellent. The chronic type responded less well. In a large percentage of cases the calcium deposited was absorbed and calcification rarely recurred.

JOHN HOETS (Sydney) discussed the surgical treatment of osteoarthritis of the hip. He said that the indications for operation were: (i) pain, unrelieved by physical therapy *et cetera*, (ii) limitation of movement when both hip-joints were affected, and (iii) deformity. The chief contraindication was poor physical condition of the patient. With regard to the choice of procedure, Dr. Hoets referred to three types of operation: (i) arthrodesis, (ii) subtrochanteric osteotomy, and (iii) arthroplasty. All these he discussed in detail. He said that the difficulty in performing a satisfactory arthroplasty of the hip joint had in recent years been largely overcome by three things: (a) the development of chemical substances to combat sepsis, (b) the introduction of vitallium, and (c) the genius of Smith-Petersen, who after years of work had developed the use of vitallium for the "hip cap" and had thus evolved a technique which permitted a tolerably good result to be obtained with reasonable certainty.

A. V. MEEHAN (Brisbane), in opening the discussion, confined most of his remarks to the surgical treatment of osteoarthritis. However, he first reiterated Dr. Duval's opinion that the pain and disability resulting from calcification in the supraspinatus tendon were best treated by X-radiation therapy. Dr. Meehan felt that Dr. Hoets had covered the important points with regard to the surgery of osteoarthritis of the hip, but added that he would bring forward some points from his personal experiences. In the treatment of the young patient whose hip disability resulted from old Perthes's disease or similar conditions, he thought that arthrodesis was the best method, because in such a case a firm bony union rather than a false joint would almost certainly occur. Moreover, union would take place relatively quickly and would be strong. Further, the patient was not troubled with degenerative changes taking

place at the hip after operation. The movement of the spine would also be good, so that walking and sitting would offer no difficulties to the patient. In the treatment of the older patient Dr. Meehan used the Lorenz type of osteotomy. In that type of patient it was likely that osteoarthritic changes would also be present in the lumbar section of the spine, so that if an arthrodesis was used movement would be poor and the gait often clumsy. An additional advantage of such an operation upon the elderly was that it was quickly performed and caused less shock to the patient. The use of a pin and plate following the osteotomy prolonged the operation time considerably. Dr. Meehan said that it could be confidently stated that the Lorenz osteotomy did abolish pain. The time required varied, but most patients were free of pain within twelve months after the operation. Movements of the knee and ankle were important post-operative considerations. Arthroplasty in cases among older patients was still *sub judice*. In Dr. Meehan's opinion the use of a vitallium cap was the best method, although he had no personal experience of it. Dr. Hoets's cases were certainly most impressive. In cases of bilateral ankylosis of the hip joints, arthroplasty was the method of choice.

LEIGH T. WEDLICK (Melbourne) said that in his opinion osteoarthritis of the knee was a condition which could always be relieved by physiotherapy. However, in the hip joint the results were less certain, and it was difficult to separate those patients who would respond well to physical treatment from those in whom the results would be less satisfactory. In his experience those with an associated fibrositis responded better than those with no fibrositic element. He agreed that the correction of associated deformities was a most important point in the treatment of osteoarthritis of the hip. With regard to Dr. Duval's paper, Dr. Wedlick said that it was well to remember that in ankylosing spondylitis the symptoms might be present for some time before radiological changes were found in the sacro-iliac joints. He also thought that deep X-ray therapy was the first line of attack in ankylosing spondylitis, and if that failed gold therapy should then be used. He asked whether Dr. Duval would speak of his experience with regard to large field irradiation as against small port irradiation. In the case of the shoulder joints, Dr. Wedlick thought that deep X-ray therapy gave variable results. He agreed with Dr. Duval that supraspinatus tendonitis associated with calcification responded well to X-ray therapy, but he thought that results were less constant with the other causes of painful shoulder. Acute tense bursitis responded best to other methods, and the ice bag or anodal galvanism gave the best results. Heat usually caused an exacerbation of the condition. In the stiff shoulder of Dupré's syndrome X-ray therapy was of little help and did not obviate the necessity for mobilization with or without general anaesthesia. Cases of painful shoulder with more movement usually resulted from tendonitis, although some observers still considered the condition to be bursitis. X-ray therapy was of assistance in treatment, but physical therapy measures, such as heat and massage, were more useful.

G. A. THOMPSON (Perth) agreed with Dr. Duval that deep X-ray therapy was of great value in ankylosing spondylitis, but said that it should not be carried out to the exclusion of other methods. He considered that bath treatment was very helpful because it encouraged movement of the limbs and spine. The patient should be lowered into the bath, well supported, so that weight was taken off the limbs, and massage carried out under water. In conclusion, Dr. Thompson insisted that movement should be encouraged in all cases of *spondylitis ankylopoietica*.

L. PARR (Sydney) said that osteoarthritis of the hip was a difficult condition to treat, and those who had looked after such patients over the years were always pleased that there was a surgical form of treatment to which they could turn. In the treatment of early osteoarthritis of the hip he had used injections of lactic acid or acid potassium phosphate in many cases. He always used "Novocain" with the injected fluid and considered that a most important point. He had used lactic acid as suggested

by Grant Waugh for most of his cases. In an effort to determine the effects of injection treatment, he had taken the pH of the fluid in the knee joint five minutes after injection and that of the blood, and had found that the pH of the joint fluid rapidly returned to that of the body. Further observation showed that the leucocyte count in the joint fluid rose after injection. Another important point about the effect of lactic acid injection was that the fluid aspirated from a joint such as the knee joint became clearer and less viscid after the injections. From experience he had found that if the patient moved the joint immediately after treatment reactions occurred, but if the patient was rested little reaction was experienced. Further, he had found that those patients with a narrow joint space into which it was difficult to get the fluid did not respond so well as those who had fluid in the joint, so that the injection could be made more readily. Those experiences had caused him to modify his routine of treatment; now a patient who was to be treated by injection was placed in bed with traction on the joint, the first injection was made on the second day in bed and a series of injections were given over four weeks. With traction and rest there was no pain or reaction. After the period in bed some wasting of the muscles about the hip might take place and difficulty in walking might be experienced when the patient was first allowed up. Massage would be of value in alleviating that condition. Dr. Parr suggested that the patient should be put in a walking caliper on first leaving his bed.

B. G. Wade (Sydney), in reply, agreed with Dr. Wedlick that anodal galvanism was the treatment of choice for tense bursitis of the shoulder. He also stressed the fact that heat made the condition worse. He concurred with Dr. Thompson that hydrotherapy and massage under water were useful adjuncts to the treatment of ankylosing spondylitis.

F. Duval (Sydney), in reply to Dr. Wedlick's question about large or small ports of treatment in ankylosing spondylitis, said that his experience was only indirect. However, at a clinic in England, where small port treatment was used, improvement was obtained in patients who had previously been given wide-port therapy without relief. He thought that more patients responded to small-port therapy. Dr. Duval said that in his experience "frozen shoulder" responded in some degree to X-ray therapy, but agreed with the previous speakers that other forms of physical therapy were a necessary adjunct.

John Hoets (Sydney), with regard to the use of vitallium caps for arthroplasty of the hip joint, said that he agreed to some degree with Dr. Meehan that the operation had not been carried out for a sufficiently long period to allow a final assessment to be made. However, he felt that some of the less satisfactory results could be caused by unsatisfactory operation, and in the case of one patient who had come to him from overseas, he thought that too small a cap had been used for the femoral head and that sufficient osteophytes had not been removed about the joint margin. Dr. Hoets's oldest patient had been operated on over four years before, and up to the present had shown no retrogression of relief from disability. With regard to injection treatment, he thought that in many gross cases of osteoarthritis injection into the joint would be almost impossible, as the joint capsule was usually densely adherent to the femoral neck and acetabulum.

SECTION OF ORTHOPÆDICS AND PHYSICAL MEDICINE AND SECTION OF SURGERY.

Traumatic Surgery.

A COMBINED MEETING of the Section of Orthopædics and Physical Medicine and the Section of Surgery was held to discuss the surgery of trauma.

C. W. B. LITTLEJOHN (Melbourne) read a paper on the traumatic unit. He first gave a brief outline of the history of traumatic surgery, from the earliest written records of

surgery in the Egyptian papyri. He said it was the development of surgery, and of traumatic surgery with it, that had shown the necessity for a special organization to deal with the injured. Traumatic surgery had for long periods been in eclipse; interest in it had been reawakened at different times by the work of Robert Jones, of Sherman, of Böhler, of Hey Groves and of Gissane. Stimulus was given by the 1914-1918 war. In Britain the final report of the Inter-Departmental Committee in the Rehabilitation of Persons Injured in Accident extended traumatic work to include civilians. The enormous development of industry, and the increase of civilian accidents, had made this necessary. The committee, among other things, recommended the development throughout the country of fracture services, later to be extended into more general accident services; it stressed the importance of rehabilitation and resettlement in industry. It deplored the system by which persons who had sustained fractures and other accidents were treated in the general wards of hospitals. Dr. Littlejohn then set out what he considered the essentials for a traumatic unit or accident service. (i) With regard to buildings, plenty of space for admission and sorting and adequate out-patient accommodation were necessary. If the unit was to be an adjunct of a general hospital, it should be separate from general admission and out-patient departments. (ii) For 30,000 accidents per year 200 beds were necessary; the provision of such beds would relieve the general wards to almost the same extent. (iii) A full-time surgical staff was necessary; for a 200-bed unit it should consist of three full teams of surgeon, assistant surgeon, registrar, two house surgeons and one anaesthetist. The part-time surgical staff included the various specialists, including a dental surgeon. (iv) Personnel for pathological, bacteriological and radiological departments were necessary. (v) Nursing staff, orderlies, clerks and almoners and a bootmaker and splintmaker were required. (vi) Physical therapists, occupational therapists, rehabilitation experts and a resettlement officer were essential. (vii) Long-stay beds in some country centres were desirable. The function of a traumatic unit was to treat all fresh injuries, burns, infections of the hand *et cetera*. Deformity or interference with function resulting from injury might also be included. Dr. Littlejohn concluded by giving some financial data, and by indicating ways in which the financial liability might be partially met.

H. H. STEWART (Perth) said that the subject had been covered so well that further elaboration would not be attempted. Dr. Littlejohn had provided stimulating and provocative thought in his remarks concerning the formation of a traumatic unit. As a general surgeon, he (Dr. Stewart) would stress most strongly the requirements for necessary follow-up and rehabilitation. He was in agreement with the suggestion that the work would best be served by traumatic units within general hospitals rather than by units of the "accident hospital" type. A unit such as that described by Dr. Littlejohn would of necessity require staffing by full-time men. He was of the opinion that traumatic surgery should be considered under two headings: firstly the welfare of the patient, who without a doubt would benefit greatly by being cared for by such a traumatic unit; secondly, the training of the student and the doctor, who might later on practise in isolated areas of the continent. Because of the latter point and the need for training, he considered that traumatic units should be within general teaching hospitals.

Without a doubt modern transportation was of value in the ease of moving a patient to the expert; but it must be realized that on occasion such movement was not possible. He strongly urged that a traumatic unit should be under the general charge and control of a general surgeon, and that orthopaedists should be called in to conduct the follow-up. But because of the tendency for injuries to be multiple, requiring not only orthopaedic work, but also that of the urologist, the cranial surgeon and the thoracic surgeon, he considered that the control should be under a general surgeon and that the assistance of other departments should be called in as required. That led him to state that he was strongly of opinion that all specialist surgeons should essentially be trained primarily and

practise as general surgeons, and he was interested to learn from American associates during the war that they also felt that in the United States of America there had been an over-development of specialization. Dr. Stewart ended on the note that in Western Australia now the general surgeons had conceded so much as to admit all fracture patients under the orthopaedic department at the Perth Hospital.

VICTOR HURLEY (Melbourne) stressed certain points about the question of a traumatic unit. The first was that it was imperative that such a unit should be associated with a general teaching hospital. Everyone had experienced the increasing difficulty in ensuring the adequate training of students, because more and more special departments were being formed, and while students attended such departments for lectures or demonstrations, such training was not in his opinion comparable in value to the practical association with patients in the ward. Such a method did not permit of detailed practice. He felt that the student now saw very little of urology or orthopaedics and practically nothing of neurosurgery. Medical curricula had not been altered to meet those varying conditions. Secondly, Dr. Hurley made a strong plea for that rapidly disappearing person, the general surgeon. He also agreed that the work of a traumatic unit would of necessity require the services of whole-time salaried staff. They all realized that the present honorary system at general hospitals was in the process of a change. He felt that superspecialization would be a further move towards a salaried hospital medical service. He admitted that the treatment would be more efficient and that the patient would benefit; but he wished to remind the audience of those long-distance implications.

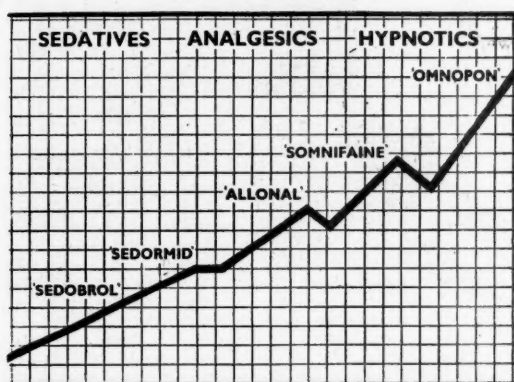
B. T. EDVE (Sydney) said that experiences in Sydney had paralleled those in other States. With regard to fracture patients, they had been set aside in a separate ward; but the general surgeons in the main were not anxious to hand over the care of fracture patients to the orthopaedic department, as they did not wish to be deprived of that class of work. He also thought that the ideas expressed in Dr. Littlejohn's paper were very good, but that no scheme should deprive students of all-round training.

B. K. RANK (Melbourne) mentioned that Professor Paterson Ross, of Saint Bartholomew's Hospital, London, was interested in the use of special departments. He considered that special departments must be grouped and must play a strong part in the teaching of the student. On the subject of the need for a specialist to be primarily a general surgeon, Dr. Rank said that he quite agreed that a specialist must be a good surgeon, but that the reverse also applied—that it was of great value to train a good surgeon in a special department.

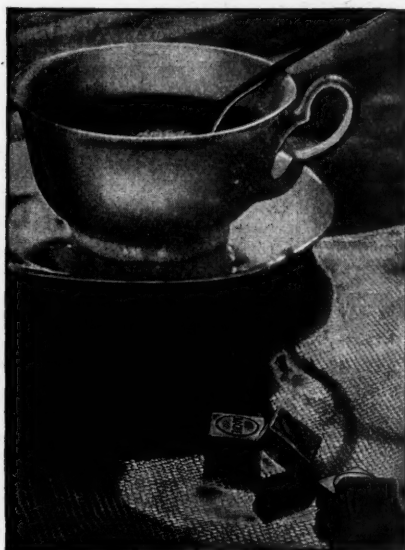
I. B. JOSE (Adelaide) said that the discussion seemed to centre round two points: firstly, the welfare of the patient, and secondly, the training of the student. Both aspects were equally important, and he felt that the ultimate solution depended upon the community. He pointed out that in Adelaide there was one general hospital only, and in that hospital it was not difficult to arrange special work by dividing the surgery among special teams.

B. T. KEON-COHEN (Melbourne) itemized four points: (i) the welfare of the patient, (ii) the training of the student, (iii) the advancement of medical science, and (iv) the convenience of the medical staff. With regard to (i), he maintained that a full-time traumatic unit was necessary, as the expert must be on the spot at all times. With regard to (ii), he maintained that a student attending the sessions at a good fracture service for a period of weeks would learn very much more than a student attending a general ward to learn about fractures over many months. With regard to (iii) (the advancement of medical knowledge and science), unless classes of work were grouped and referred to one unit or team, it was not possible for anyone to be concerned with sufficient numbers to produce really good results. In other words, the patients should be concentrated in one unit, so that they could assist in advancing knowledge, rather than dispersed, so that one

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man or one team saw very few in a year. With regard to (iv), he thought that the convenience of the medical staff had no place in the argument at all.

C. W. B. LITTLEJOHN (Melbourne), in reply, thanked the speakers for their remarks and their friendly criticism. The main comments appeared to him to concern (a) depriving the student of a certain class of training, and (b) not assisting in developing the surgeon. With regard to students, he said that he was not convinced by any argument; but he felt sure that training of the student over a short period in a special unit would be better than a longer period spent in a general ward. With regard to the surgeon, there would be ample opportunity for the normal rotation of house surgeons, assistant surgeons, associates and clinical assistants, and a high proportion of those would learn the best treatment for trauma.

B. K. RANK (Melbourne) read a paper on the subject of hand injuries. He divided the injuries into two categories, "untidy" injuries, such as those produced by power-driven saws, power presses and buzz planes—in fact, any mobile machinery—and "tidy" injuries, such as those caused by choppers, cutters, knives, axes or glass. He said that the main purpose of his paper was to illustrate the management of hand injuries under wartime and under civilian conditions, and to make the point that complex secondary procedures which were indicated in war injuries could and should be avoided by full application of primary reparative procedures in civilian injuries. His remarks were accompanied by the showing of a cinematographic film. He said that under normal conditions all hand injuries presented for primary treatment could be rendered clean surgical wounds fit to close. The main object of their primary treatment was an effective and complete soft tissue closure, no matter how severe the injury, what the tissue loss, or what tedium such a procedure might mean for the surgeon. Fractures and dislocations could be reduced, but whether or not tendons and nerves were repaired was a different matter. If the highest standards of primary healing could not be anticipated with absolute confidence, the repair of tendon or nerve was generally ill-considered. Some thought and some understanding of the manner in which the injury was received, together with the subsequent first-aid and casualty treatment, were much better guides to the likelihood of obtaining primary healing than was academic consideration of the time interval. The surgeon should be concerned, not with indications for wound closure, but with the technicalities of best achieving wound closure. After having discussed a number of methods of treatment, Dr. Rank stated the following two conclusions: (i) There was no longer room for a fatalistic attitude where severed flexor tendons were concerned. If the joints were mobile and a finger had sensation, it was wrong to amputate a finger merely because flexor tendons had been severed. From that point of view the interest of surgeons was in line with that of the insurance companies. (ii) It was impossible to advance with the difficult problems of tendon repair unless the patients were concentrated in the hands of a few surgeons; thus some would be enabled to handle sufficient numbers, not only to acquire the necessary technique and improve it, but also to sift and try new methods which would arise.

A. L. DAWKINS (Perth) said that it seemed to him that for far too long tendon surgery had been the poor relation of the better known branches of surgery. For years Bunnell had been preaching his gospel and showing the way; but many people who had tried had been unable to reproduce his results, and a certain feeling of hopelessness towards that branch of surgery became evident. The results produced were often so indifferent that the effort involved seemed scarcely worth while, and in many cases the treatment of recent lacerations was delegated to house surgeons and the less experienced. After all, there was no danger to life—only one or more fingers were involved, which would become more or less stiff anyway. That possibility became almost a certainty if the tendon was cut in the area that Bunnell referred to as "No Man's Land"—between the proximal interphalangeal crease and the distal palmar crease. Thus it was not surprising that one fre-

quently saw workmen who complained that a finger, in which the power of flexion had been lost, was more nuisance than it was worth, and asked for it to be amputated. To many manual labourers the loss of a finger might be of no great moment; but in certain specialized trades or professions it might be a tragedy of no mean order. But in any case, no hand which was deficient in one or more fingers was as good as the complete hand; and as most of the injuries occurred in young, healthy adults, often at the peak of their wage-earning capacity, no effort was too great to save them from mutilation if a reasonably good reward for one's efforts could be expected. Dr. Dawkins went on to say that, possibly as a result of the war, that difficult and exacting branch of surgery had received a new impetus, and many men were now writing and publishing excellent results. Those present had heard a further contribution from Dr. Rank. His results proved once again that, given patience and the necessary skill and judgement, the effort was abundantly worth while. Dr. Dawkins thought that the subject could be reviewed from two aspects—first, the repair of the recently cut tendon, and secondly, the reconstruction of the hand after irreparable tendon or nerve damage had occurred. The problem of the repair of the recently cut tendon would never be solved until it was removed from the hurly-burly of the casualty department into the comparatively peaceful and contemplative atmosphere of in-patient ward and operating theatre. Too often such repairs were attempted in the casualty theatre by inexperienced resident medical officers with knowledge inadequate for the solution of the problem, and often insufficiently grounded in the minutiae of aseptic technique. The first step in the solution of the problem lay in regarding the injury with the same seriousness as one regarded a compound fracture, the patient being admitted to hospital into the beds of a specially trained team—another argument in favour of the traumatic unit so earnestly advocated by the President. That was all the more important since it was being realized that often full function would be obtained only by a tendon graft or tendon transplant, rather than by a repair of a tendon divided in "No Man's Land". The excellent results of tendon grafting in the hands of the expert would almost certainly not be reproduced by the inexperienced. Again, as after-treatment was of perhaps greater importance than the immediate treatment, it was almost essential that the former should be undertaken by the surgeon who performed the operation. The after-treatment might include median or ulnar nerve blocks, so that active movement could be undertaken without pain—stretching, manipulation and sometimes a second operation to free a tendon or graft which had become partially adherent. The second field—the reconstruction of the irreparably damaged hand—offered an infinite variety of possibilities, depending on the damage to be repaired. The tendon transplant to improve the deficiencies of a musculospiral nerve injury were well known, but many other possibilities were not so generally known. For instance, if finger movers were deficient, but wrist movers were present, one fused the wrist and transferred the action of muscles thus made available into the fingers. If more muscle had been lost, more joints might have to be fused, and the best final results might be obtained only through a nice combination of fusions and transplants. Another fusion which might be necessary was a bone graft between the first and second metacarpals, to fix the thumb in the position of opposition. A point to be remembered in the transplanting of tendons was their excursion. Digit extensors were estimated to move between two and three inches between full flexion and full extension, while wrist tendons moved only about half that amount. Therefore, if transplantation was performed, the range of finger movement, though useful, could not be expected to be complete. However, the various combinations of nerve and tendon loss might be so variable that each case would need to be dealt with on its merits. Dr. Dawkins said that his experience had been small, but he had dealt with sufficient cases to realize the almost infinite possibilities of a judicious combination of fusions and tendon transplants in restoring some measure of useful function to apparently useless hands. He thought it was a field that had been left untouched by too many

of them for too long. He was grateful to Dr. Rank for making them aware of some of its possibilities.

L. C. LINDON (Adelaide) presented a paper on head injuries in civil practice, which was read on his behalf by H. H. Stewart (Perth). He said that there were only two absolute indications for early operative interference—(i) an open wound of the scalp—every effort should be made to obtain primary union of the scalp—and (ii) evidence of a progressive localized compressing lesion. Referring to post-traumatic oedema of the brain, Dr. Lindon said that it was his impression that Cairns considered that the actual damage to brain substance was more extensive and diffuse when the rapidly moving head struck a stationary object than when a rapidly moving missile penetrated the stationary head. If that was so, then it seemed that the dura might be safely closed after excision of brain damaged by a missile, or after excision of a tumour, but it was not always wise to close the dura over a brain which was grossly lacerated and contused as the result of a head-on collision. Local and fatal hypothalamic injury could occur without any rise in intracranial pressure; but one should be prepared for gross swelling of brain in severe civilian accidents. The head-on type of civilian injury was particularly prone to cause a fracture involving the frontal sinus and then running backwards along the floor of the anterior fossa, opening up the ethmoid air cells or the optic foramen. The immediate risk was meningitis; the later risk was the development of cerebro-spinal fluid rhinorrhoea and meningitis. Prior to the use of chemotherapy, either complication carried a high mortality rate. Dr. Lindon then gave details of the conditions under which conservative treatment might be justified and those requiring operation. Referring to nursing problems, Dr. Lindon mentioned the importance of three points: (i) proper position of the patient, (ii) adequate feeding and (iii) the judicious use of sedatives. He then said that associated spinal injury was easily overlooked in the early stages of management of a patient with a head injury. Two types should be borne in mind and sought: (i) injury to the lumbar portion of the spine and (ii) injury to the cervical part of the spine. With regard to organization, he said that the management of patients with head injuries fell into two categories: (i) immediate or life-saving treatment, and (ii) later management, upon which depended morbidity and economic recovery. With regard to (i), he urged the formation of a single team to deal with all head injuries in Adelaide, so that, as the total number of such casualties was not large, the members of the team might increase their knowledge. He emphasized the need for the development of judgement rather than technique. With regard to (ii), he said that the development of a post-traumatic psychosis was largely influenced by three factors: (a) the pre-traumatic psychic status of the patient, (b) economic factors and (c) problems of convalescence. He commended the work being done in that connexion by the rehabilitation division of the social services in South Australia, but amongst ex-service personnel only. It provided general physical therapy, occupational therapy and vocational training. Dr. Lindon recommended the extension of the work to all members of the community.

J. P. AINSLIE (Perth), in opening the discussion, said that it had been a pleasure to listen to Dr. Lindon's instructive paper. It was the result of a wide experience of cerebral injury, not only in civilian practice, but in the two great wars. Dr. Ainslie said that his own experience had been confined to the injuries of civilian practice and to the late effects of war injuries. The great majority of patients suffering from head injuries within the metropolitan area came under the care of the honorary surgical staff of the public hospitals; but an almost equally large number were admitted to the country hospitals under the care of the country practitioners. Dr. Lindon had emphasized the advantages which would accrue if all patients suffering from cerebral trauma were admitted in the care of one group, either the neurosurgical team or a special head injury unit. The advantages were obvious; not only would members of the team become more and more skilled in the management of that difficult problem,

but also the nursing staff would become increasingly proficient. A sister with special training and experience was of inestimable value, for both observation and actual nursing care of the seriously ill patient.

Dr. Ainslie's only concern was that many resident medical officers would subsequently find themselves confronted with severe head injuries in country towns without previous experience of such cases. He did not consider that that disadvantage could be lightly ignored; every new clinic formed lessened more and more the diversity of experience gained by the resident medical officer in the general surgical wards. He emphasized the desirability of more adequate rehabilitation of the patient recovering from a head injury; the patient with an established post-traumatic syndrome presented a problem which in his experience was most difficult to treat. He was convinced that those symptoms must be prevented if the late morbidity rate was to be lowered. Prevention was possible only in an adequately organized rehabilitation centre. In a recent address in Adelaide, Sir Hugh Cairns had emphasized the importance of adequate rehabilitation, and had pointed out the effect of industrial conditions on the recovery of the patient suffering from a head injury. During the war 11,000 patients suffering from head injuries had passed through the unit at Oxford. Cairns was struck by the low figures relating to those who failed to recover completely. He attributed them mainly to the fact that during the war there was a job for every person in Great Britain, whether he was 100% efficient or not; he knew that his country needed him, and the result was that work was available for these people just as soon as they were fit to undertake any responsibility. Few developed sequelæ, which proved that removal of the fear of unemployment played an important part in rehabilitation.

Dr. Ainslie went on to say that there was need for a change of attitude towards the person recovering from a head injury; the days of specially darkened rooms, freedom from noise, isolation from other patients—all factors which created in the patient an atmosphere of concern and fear of the future—must go. He should be encouraged to get up within a few days of recovering consciousness, and his complaints, although not ignored, should be treated with encouragement and assurance. "Mollycoddling" produced fixation of symptoms and must be avoided. From the moment of his return to consciousness, all concerned in the management must adopt an attitude of cheerful encouragement, an attitude of assurance that the symptoms would gradually lessen.

In his paper Dr. Lindon had discussed the question of whether the dura should be closed in extensive civilian injuries. Dr. Ainslie said that his practice was to close the dura completely. He felt that if oedema did occur, with increasing intracranial tension the damaged oedematous brain was herniated out through the dural opening, and areas of compression with vascular obstruction occurred which were more harmful than a more evenly distributed pressure. Dr. Lindon had discussed the treatment of cerebro-spinal fistulæ occurring after the common type of head injury caused by the moving head's striking an immobile object. Although there was an increasing tendency to operate early in such cases, he—Dr. Ainslie—considered that they could afford to be more conservative now that they had the advantages of modern chemotherapy, and operation should not be attempted by one inexperienced in cerebral surgery. The problem of closure was not simple, particularly if the fistula was through the cribriform plate. Improved radiological technique was of value in the diagnosis of such fractures; those interested should study the technique evolved by Johnson and Dutt during the difficulties of the Burma campaign. The operation should be performed through a bilateral frontal opening, and was simplified by an intradural approach after division of the anterior end of the longitudinal sinus. One absolute indication for operation was the development of an intracranial aerocele; that emphasized the desirability of frequent X-ray examinations in all cases of frontal injury to detect the development of such a condition in the early stages.

Dr. Ainslie said that he wished to conclude with a few words of advice to the isolated country practitioner. Recent war experience had proved that the victim of a head injury travelled well by modern ambulance. Risk of transport was less than risk of operation under unsatisfactory conditions. He himself would feel most unhappy if called upon to operate on a lacerated brain due to a compound fracture of the skull without modern equipment. Adequate suction, a diathermy apparatus and facilities for blood transfusion were essential, and fibrin foam, thrombin and silver clips should be available. Elevation of a depressed fragment of bone might suddenly confront the surgeon with hæmorrhage of terrifying extent; a smooth operation might become chaos within a matter of seconds. Absolute hæmostasis was essential, but packing with gauze played no part in cerebral surgery. The country practitioner was often confronted with a seriously ill, deeply unconscious patient with a closed head injury. What should he do? Relatives demanded activity. He should be definite in his own mind of the indications for operation, and be definite in his opinion to anxious relatives. Nothing was to be gained by decompression when the patient was deeply unconscious from the moment of impact onwards. The doctor's activities should be directed towards painstaking observation, the treatment of shock and the maintenance of adequate oxygenation; the airway must be kept clear of mucus by elevation of the foot of the bed, by posturing of the patient on his side or if necessary face downwards, by suction of the naso-pharynx and by the intranasal administration of oxygen. The damaged brain demanded oxygen. When one saw the increase of intracranial tension which occurred during the course of an intracranial operation with inadequate oxygenation, one could not fail to be impressed with the need for an adequate oxygen supply. The country doctor in such circumstances would probably ask himself whether he should perform lumbar puncture or institute dehydration therapy. The answer was, no; the only indication for lumbar puncture in the early stages of a head injury was in the treatment of the extremely restless patient. Withdrawal of heavily blood-stained fluid would often quieten him considerably. Dehydration might play a part in the later treatment, but in the early stages it was of no value, except possibly to keep a patient alive while he was being prepared for evacuation of an intradural or extradural hæmatoma. Adequate observation was essential; progressive deterioration, particularly in the degree of consciousness after a state of improvement, was a certain sign of increasing intracranial hæmorrhage, either intradural or extradural, and must be accepted as an indication for immediate operation. The making of a trephine hole in the temporal fossa was a simple procedure; one must not wait for paralysis, coma and a fixed dilated pupil—advanced signs of a hæmatoma. If clot was not found in the classical position, it should be looked for elsewhere; exploratory "taps" were simple; it was humiliating to find a missed hæmatoma at autopsy. The role of the country practitioner was not easy; a good reference book on head injuries was not costly and would relieve him of many worries.

SECTION OF OTO-RHINO-LARYNGOLOGY AND SECTION OF PÆDIATRICS.

Sinusitis in Children.

A COMBINED MEETING of the Section of Oto-Rhino-Laryngology and the Section of Pædiatrics was held to discuss sinusitis in children.

S. PEARLMAN (Adelaide) read a paper on the subject of sinusitis in children. He discussed chronic maxillary sinusitis as it affected children and referred to relevant points in anatomy, physiology and pathology. He said that diagnosis was usually possible from a survey of the symptoms and signs, which were fairly constant. Exploratory suction was used to clinch the diagnosis when necessary. Sinusitis was associated with certain diseases. Adenoids tended to keep the condition "alive"; tonsils should not be removed unnecessarily from young children.

Respiratory infections were common and were one of the serious results of sinusitis. The role of sinusitis in the onset and development of bronchiectasis was doubtful; nevertheless its surgical treatment in that condition was considered justifiable. Every child with nasal symptoms was a possible sufferer from allergy. Mixed allergic and infective conditions often coexisted. Bacterial sensitivity offered an explanation in some cases. Ear infections were common in chronic sinus disease. In treatment it was recognized that in most cases the condition underwent spontaneous resolution. General measures were important, with adequate protective foods and accessory food factors. The value of nasal vasoconstrictors depended on their isotonicity and on their instillation with the patient in the head-low position. Considerable success had resulted from Proetz displacement therapy. Irradiation of the naso-pharynx and short-wave therapy had their useful but limited place in treatment. Surgical measures included simple proof puncture of the antra. The old intranasal antrostomy with a large "window" was unsatisfactory in the treatment of children. It was proved that even in gross disease cure could be effected without antral "windows". A method of treatment with indwelling rubber tubes for lavage and the instillation of antibiotics was explained and its advantages were stressed. Dr. Pearlman said that that was the procedure which he usually used. Radical antrostomy was reserved for the treatment of gross disease only.

R. H. SOUTHEY (Melbourne), in opening the discussion, said that an important point in the diagnosis of sinus infection in children was that those who were old enough complained of "eyebrow ache". That always roused suspicion of sinus disease. Persistent nocturnal cough, often associated with an element of spasm, was always suggestive of the disease. He stressed the difference in the clinical features of allergic and infective sinusitis, and said that often as a preliminary to more complicated treatment, a change of mattress or pillow was beneficial. Before removing the tonsils and adenoids from a child, it was wise to ensure that sinusitis did not exist; otherwise promises of cure would be fruitless. Often in those children presenting after removal of tonsils and adenoids, persistence of symptoms, vague malaise and a constant rise in temperature should direct the clinician's attention to the accessory nasal sinuses. Dr. Southey supported conservative treatment, and said that of supplementary value was a high vitamin and high protein diet, and perhaps a change of environment. Removal of sinus infection was important, because experimental evidence revealed that there was a risk of spread of infection to the chest.

COLIN MACDONALD (Melbourne) said that X-ray examination of the paranasal sinuses was now one of the commonest procedures in pædiatric radiology, but it should be emphasized that it had distinct limitations in the diagnosis of sinusitis in children aged under two years. That was due to two factors, one technical and the other anatomical. Because a sharpness of radiological definition of the bony outlines of the sinuses was essential to satisfactory interpretation, the examination was of little use below that age when the young patient could be properly postured, and trusted to keep still, during the X-ray exposure. All radiologists, but perhaps not all clinicians, were aware of the extreme difficulty of taking satisfactory films of young patients. They wriggled out of position like eels, and when once the postural symmetry was destroyed, the examination was almost valueless. Postural symmetry was strictly necessary, because an essential part of the interpretation was the comparison of both sides. Such technical difficulties were inherent in the fact that the face of the young patient must be approximated close to the film or Bucky diaphragm, and many young children became resentful and frightened in that position. Sometimes they could be made amenable by three-quarters of a grain of "Seconal" or other sedative, given at the appropriate time before examination.

Dr. Macdonald went on to say that two standard views were taken, one for the maxillary antra known as the "chin-nose", the other known as the "nose-forehead" for the ethmoid and frontal sinuses. He was rarely asked

to take films of the sphenoidal sinuses of children, but if they were required, lateral and vertical views were necessary. The pictures should be taken with the child in the sitting posture, because of the aim to demonstrate horizontal fluid levels. Before any interpretation was attempted, the films should satisfy the canons of first-class radiography, and that required patience, skill and adequate assistance. It might well be necessary to take several films before satisfactory pictures were obtained. In accessory sinus work, as in other branches of paediatric radiology, rushed or cheap radiology almost invariably meant poor radiology, and that was not worth the undertaking. It was better to rely solely on clinical examination than to invoke an ancillary investigation that could be quite misleading. Whenever possible, interpretation, except of a tentative nature, should not be made on wet films; even the reflections of daylight on wet films could cause confusion.

Turning to anatomical considerations, Dr. Macdonald said that they were bound up with that imperfect pneumatization of the cavities and cells which normally obtained in infancy and early childhood. The X-ray diagnosis depended essentially on the radiographic contrast between the bony structures and the air content of the cavity or cells, and so the greater the air content, the easier the radiographic deductions. Diagnosis was made from a contraction in size, or from obliteration, of the normally radiolucent air-containing areas, by thickened mucosa or by mucopus. Only when sufficient air remained in the cavity or cell was it possible to demonstrate empyema, and that by an upper, approximately horizontal, fluid level; such a level could naturally be obtained only when the pictures were made with the patient in the erect posture. Dr. Macdonald said that in his experience in dealing with children aged under two years, the antral cavities were usually too small and the technical difficulties too great for reliable help to be given radiographically, and the same applied to the ethmoidal cellular system. Mainly because of the imperfect pneumatization below that age, the tendency was to interpret mucosal inflammation as being present more frequently than was the case. Furthermore, the rudiments of the deciduous or permanent teeth often cast confusing and obscuring shadows over the antral areas. The developing frontal sinuses were not radiographically differentiated from the anterior ethmoidal cells in infancy, but the differentiation increased with age, so that at eight to ten years the appearances were not unlike those seen in adults. It could thus be seen that the older the child, the more information could be obtained by the X-ray method. It was important for the radiologist to remember the kinetics of allergic mucosa. At one examination large polypoidal mucosal swellings might be seen, either as such, or represented by a homogeneous obscuring of the antral radiolucency. Even on the next day the cavity might radiographically appear so normal that it was difficult to believe that the patient was the same child. In interpreting the presence of polypi, one must not confuse them with projections of the normal soft tissue lip margins.

Dr. Macdonald went on to say that the clinical condition of broncho-sinusitis was so common in his view that the radiologist was sometimes tempted to make such a diagnosis on films alone; but that was unsound, because it presupposed that simple bronchitis could be diagnosed by increase in the size and density of the hilar shadows and the pulmonary area markings. However, the line between the normal and abnormal in those shadows was far from sharp, and it was now known that both the hilar shadows and the linear markings in a child's chest were variants, differing as widely as the size of the nose or the colour of the hair. There was no parallelism between the frequency of infections of the paranasal sinuses and the presence of large hilar shadows and heavy bronchovascular markings. The size and density of those shadows appeared to be already fixed in the first weeks of life, and bore no constant relationship to the frequency and severity of later respiratory infections. It was the stethoscope which diagnosed the bronchitis, and so broncho-sinusitis remained a diagnosis to be made by the clinician and not by the radiologist.

ERIC GUTTERIDGE (Melbourne) said that in the diagnosis of broncho-sinusitis a helpful point was the tell-tale dark lines beneath the child's eyes. It was important to exclude allergic sinusitis, and in allergic sinusitis to attack the allergens first. He described picturesquely the pathology of catarrh of the upper respiratory tract and the physiology of the nasal sinuses. He stressed the importance of restoration of normal physiological function as a principle of operative treatment. Removal of adenoid masses was essential to restore normal aeration of the sinuses. Short-wave diathermy was valuable in some cases.

BALDWIN GILL (Perth) said it was criminal to touch a child's tonsils until one had taken every precaution to exclude sinusitis. The mother who arrived with her child and an X-ray film, stating that something must be done about her child's sinuses, was to him a cause of great annoyance. She had with her a permanent record of a temporary event, which could be grossly misleading.

H. BOYD GRAHAM (Melbourne) said that many cases of sinusitis in children were within the scope of treatment of the general practitioner, and did not need a specialist's attention. He stressed the importance of teaching the child to blow its nose properly, and to rid itself of bronchial secretion. That was best done in a vulgar fashion, over the bath with the tap running.

GEORGE HALLIDAY (Sydney) said that in all cases general treatment, such as maintenance of a satisfactory haemoglobin level and good standards of diet and general hygiene, was important. He disagreed strongly with Dr. Boyd Graham on the subject of nose-blowing, and said rather teach the children how to breathe properly, with the aid of the physiotherapist and the dentist.

ROY WATSON (Melbourne) supported Dr. Halliday's remarks and said the correct way to blow the nose was by a sniffing or snorting mechanism. He used nasal drops containing a silver preparation and ephedrine (0.5%) to assist in establishing an airway.

L. T. WEDLICK (Melbourne) supported Dr. Gutteridge's remarks on the use of short-wave diathermy. He said that the value of breathing exercises and physical therapy could not be over-estimated.

N. M. CUTHBERT (Perth) thought that the use of antibiotics and sulphonamide drugs had done a great deal to alleviate sinus infection, but that virus disease of the upper respiratory passages was still to remain a problem. He was in favour of improving the physical state of the child by suitable exercises, including methods of breathing and chest expansion.

S. Pearlman (Adelaide), in reply, thanked the previous speakers, and particularly Dr. Colin Macdonald for revealing the limitation of X rays. Short-wave diathermy was used in Adelaide and was of value in the early mild case. He drew attention to the higher incidence of "dirty noses" in public hospital patients than in private practice, and suggested that that was due to numerous infective insults from overcrowding and poor hygiene. That might improve when the community's basal level of immunity was raised. Nose-blowing in children was always a problem, and the mother should be persuaded to teach her child how to do it correctly. He agreed with Dr. Halliday on the importance of general measures and especially on the value of a normal blood picture. He was doubtful of the relationship between sinusitis and bronchiectasis. In many cases bronchiectasis was seen without accompanying sinusitis.

SECTION OF PÆDIATRICS AND SECTION OF SURGERY.

Congenital Heart Disease; Intestinal Obstruction in Infants.

A COMBINED MEETING of the Section of Pædiatrics and the Section of Surgery was held to discuss congenital heart disease and also intestinal obstruction in infants.

CYRIL FORTUNE (Perth) read a paper on the subject of diagnosis in congenital heart disease. He said that no longer should the diagnosis of congenital heart defect be

made without a more specific differentiation of the nature of the defect. Maude Abbott's classification into three clinical groups was still acceptable. The first was the "acyanotic" group, in which there was no abnormal communication or shunt between the right and left sides of the heart; the conditions comprised were simple dextrocardia, anomalies of the pericardium, primary congenital hypertrophy of the heart, pure subaortic or aortic stenosis, pure mitral stenosis, coarctation of the aorta and aortic arch anomalies. The second group was known as the "cyanosis tardive" group, an arterio-venous shunt being present so that the arterial blood flowed into the pulmonary circulation; the abnormalities comprised defects of the interauricular septum, defects of the interventricular septum, defects (localized) of the aortic septum and patent *ductus arteriosus*. The third group was the "cyanotic" group, the cyanosis being due to a large flow of venous blood into the systemic circulation; into that group fell defects of the interventricular septum with dextroposition of the aorta, tricuspid atresia with septal defects, tricuspid stenosis, transposition of arterial trunks with defects of the ventricular septum, persistent *truncus arteriosus* and the tetralogy of Fallot. Dr. Fortune discussed in detail the diagnosis of only those defects which were amenable to surgical treatment. In the first group he referred to coarctation of the aorta and to aortic arch anomalies, in the second group to patent *ductus arteriosus*, and in the third group to the tetralogy of Fallot. He said that in the past three years, chiefly owing to the work of Bing in Baltimore, and of Dexter in Boston, physiological diagnostic tests had been introduced to supplement the clinical procedures normally used in the diagnosis of congenital heart disease; the new tests were particularly necessary in complex cases, in which the pre-operative diagnosis was in doubt. By the use of the intracardiac catheter the pressures of the chambers could be ascertained, gaseous analyses of the oxygen content of the blood could be made, and "spot" films could be taken of the catheter with or without the use of "Diodrast" at the same time. The diagnosis of congenital cardiac defects in complex cases required the concerted efforts of a team of workers—physiologist, biochemist, physician and radiologist. Dr. Fortune laid great stress on the importance of team work. In conclusion he said that it was recognized that the stimulus in that field of surgery had been prompted by the great advances made by thoracic surgeons in the last decade.

C. J. OFFICER BROWN (Melbourne) discussed the surgical treatment of congenital heart disease. He said that in 1937 White had stated that there was no medical or surgical curative treatment for congenital heart defects. Since then surgical methods had been introduced for the treatment of patent *ductus arteriosus*, of coarctation of the aorta and of pulmonic stenosis or atresia. Discussing first patent *ductus arteriosus*, Dr. Brown said that patients with that condition might live a normal life and die of old age; but many died young as a result of complications of their condition. In 1940 Tuoroff had advanced the view that subacute bacterial endocarditis was an urgent indication for closure of the ductus. Before the introduction of penicillin, ligation was successful if the vegetations had not spread along the ductus to the aortic side. Endocarditis was still an urgent indication for ligation; but the infection should be controlled with penicillin and the inflammation and the friable condition of the ductus allowed to subside before the operation. Retardation of growth and evidence of cardiac strain were the other absolute indications for closure of the ductus. Dr. Brown said that his own view was that in the absence of contra-indications every patent ductus that was recognized during childhood should be closed surgically. The risk of operation was low—almost certainly less than the risks of endocarditis, cardiac failure and aneurysm and rupture of the ductus. Dr. Brown then gave same statistics from Gross and Jones's series, and quoted figures from the Alfred Hospital, Melbourne. He said that at that institution 33 patients had been subjected to operation and one had died from hæmorrhage. In five cases no ductus was found, in 27 cases the ductus was closed, and in one case

the ductus was divided and sutured. The first patient subjected to operation had a recurrence and the second patient died from hæmorrhage; all the others had done well. Blalock's method was used, the ductus being closed by the placing of a pursestring suture of fine silk at either end and the insertion of two or three running mattress sutures through the closed ductus between the pursestrings. That method was held to be safer than division, and in the Alfred Hospital series had seemed to give complete satisfaction. Referring to coarctation of the aorta, Dr. Brown said that operation was reserved for those patients suffering from a so-called adult type of coarctation, in which the stenosis was limited in extent and usually situated at about the site where the ductus joined the aorta. The operation was safer if the patient was aged under twenty-five years, because above that age atheroma of the aorta was present in many cases, and that condition increased the hazards of operation. Turning to pulmonary stenosis or atresia, Dr. Brown said that the majority of patients with that condition were suffering from the tetralogy of Fallot and had in addition dextroposition of the aorta with a high ventricular septal defect and consequent enlargement of the right ventricle. Blalock had shown that the best operation was an end-to-side anastomosis of the subclavian branch of the innominate artery to a pulmonary artery. The operation was best performed on children aged between three and ten years; it did not cure them, but it enabled them to live nearly normal lives. Willis J. Potts, Sidney Smith and S. Gibson in 1946 had described a technique for making a direct anastomosis between the aorta and the left pulmonary artery. Dr. Brown said that it was difficult to decide which of the operations would prove the more satisfactory; but whichever was used, it was important to try to make the artificial *ductus arteriosus* of such a size that it would relieve the polycythæmia and increase the patient's exercise capacity without at any time over-burdening the left ventricle to such an extent that the heart would become dilated and break down. Both operations were easier to perform on the left side. The Potts operation must obviously be performed on the side on which the aorta was placed. Blalock's operation was better performed on the side opposite to that on which the aorta was placed. In about 20% of the patients the aorta was on the right side. At the Alfred Hospital the present practice was to perform the operation always on the left side; thus the Willis Potts operation was used when the aorta was normally situated, and the Blalock operation when the aorta was on the right side. Operation had been performed on 13 children with the tetralogy of Fallot. In two instances the operation could not be completed because the pulmonary artery was absent in one and very small in the other. One of the two children had died. The other 11 patients had done well. Operation on one had been too recently performed for the degree of improvement to be estimated, and in another case undue enlargement of the heart had occurred, suggesting the possibility of cardiac failure. Ten of the anastomoses had been made between the aorta and the left pulmonary artery, and three between the left subclavian artery and the left pulmonary artery.

KEMPSON MADDOX (Sydney) opened the discussion by saying that they must be actively on the lookout for those conditions in young people, as the prognosis was materially improved by early operation. With reference to patency of the *ductus arteriosus*, he questioned whether adults who were in perfectly satisfactory health should be subjected to operation, though he was in agreement with Dr. Fortune and Dr. Brown that adolescents and young children should be operated on. There might be a slight risk of subacute bacterial endocarditis, but that condition was more amenable to chemotherapy if the operation had been performed. Speaking of the tetralogy of Fallot, Dr. Maddox paid a tribute to Dr. Brown and his team for providing such a good primary series of cases in Australia. While they had done nothing yet in Sydney, they were making the necessary arrangements and were eager to make a start. Dr. Maddox realized that Dr. Fortune had not had time to describe thoroscopy as an alternative to vascular catheterization. He said that it would be possible

to have ancillary procedures investigated in the various clinics with a view to improvement in routine investigations, which were still in the early stages of the way to perfection. When he was in Australia recently, Dr. Wilfred Evans had said that they had done relatively little of that work so far in Great Britain; Blalock and others in America had had the advantages of observing patients for so long as five years after operation, and on the whole they were standing up well to the results of the operation. If only five years could be added to the lives of the patients, and if they could be made more comfortable, it was all well worth while.

D. G. MCKAY (Adelaide) said that he too was particularly interested in Dr. Brown's results; they were fortunate to have Dr. Brown and his team at work in Melbourne. On a number of occasions he (Dr. McKay) had been privileged to see the team at work; his anaesthetist had accompanied him and Adelaide had had the benefit. He was able to report that in a small series of cases he had performed the operation of ligation of a patent *ductus arteriosus*, but so far he had not felt capable of embarking on the anastomotic procedures. He had performed three of the operations in 1943; the first one went well and the child had reached eight years of age; she was able to go hiking and often walked five or six miles at a time. It was of interest to note that that patient was thin and had been a "rubella" child. He remarked that they had had a large proportion of patent *ductus* cases in the "rubella" series, which was perplexing, as most of the effects on the foetus of maternal rubella during pregnancy were of the severe degenerative type rather than developmental anomalies. At the last ligation, in which he had followed the technique used by Dr. Brown, they had had an unfortunate occurrence. The operation went well and the child was up and home on the twelfth day, but returned to hospital on the fourteenth day with a febrile condition and died subsequently. She had sustained a *Staphylococcus aureus* septicæmia and pericarditis. At autopsy a commencing aneurysm was found to be present at the aortic end of the ligated *ductus* and the ligation must have cut in, predisposing to the formation of a hematoma, which was infected and was the basis for the sepsis. The patient had had sulphadiazine therapy, but no penicillin. Dr. McKay then made a plea that the more technical and highly specialized anastomotic procedures should be left to those with special ability and experience; the work should be concentrated in a limited number of centres, as there were not enough cases for many surgeons in Australia to become expert. In conclusion he paid a tribute to Dr. Brown and his efficient anaesthetist, Dr. R. H. Orton, for their excellent contribution to cardiac surgery.

R. H. ORTON (Melbourne) directed attention to the very large change in cardiac output. He said that the left side of the heart was reduced in size by the *ductus* operation, but the reduction had to be threefold in the tetralogy operation before cyanosis was relieved, so that the persistence of some cyanosis was consistent with a satisfactory improvement after the tetralogy operation.

B. T. EDYE (Sydney) said that he was also a great admirer of Dr. Brown and his team, who had set a high standard; but he hoped that their results would not encourage too many others to start in that difficult field of surgery, which was by no means so easy as Dr. Brown had made it sound; the great risk was serious hæmorrhage. The subject had been introduced into Australia by a Sydney physician, Dr. B. T. Shallard, who had induced Dr. Edey to undertake one of the first ligations; but the hæmorrhage was discouraging. He had performed the original operation several times with unsatisfactory results, and had reluctantly discontinued the work, though he realized that by improvements in operative procedures many of the original difficulties might be overcome. So far no one in Australia had operated on a subject with coarctation of the aorta.

C. J. OFFICER BROWN (Melbourne), in reply, said that as the hour was late he would restrict himself merely to a formal expression of thanks to those who had spoken; but he wished to make it clear that he had described the

results of the work of a team, and he was particularly fortunate to have Dr. Orton as anaesthetist; in 19 consecutive cases he had had no anæsthetic troubles and the patients had shown no distress even when the pulmonary artery was clamped.

A. MURRAY CLARKE (Melbourne) read a paper entitled "Intestinal Obstruction in Infants: A Challenge", based on 836 cases of intestinal obstruction in children aged under three years at the Children's Hospital, Melbourne. The cases were divided into two sections covering the five-year periods from 1932 to 1937 and from 1943 to 1948, and included the 87 cases of acute appendicitis in which the 13 deaths that occurred were obviously due to intestinal obstruction of a paralytic type. Review of the 836 cases showed that, although an appreciable general lowering of the mortality rate had occurred, it was still excessively high. Dr. Clarke said that the results obtained in the treatment of pyloric stenosis gave the clue to the improvement in all the rest—that correction of deranged blood chemistry was almost as important as relief of obstruction. In the words of Moynihan, surgery had been made safe for the patient and the patient had now to be made safe for surgery. Three main factors were involved in the lowering of the mortality rate. The first was adequate supportive treatment before and after operation. That must include primarily replacement therapy with fluid, electrolytes, blood and plasma. Dr. Clarke mentioned the amounts required and the rate of administration, and drew attention to the danger of overdosage with salt. Gastric suction was included under the heading of supportive treatment, as was also chemotherapy with sulphonamides, penicillin and streptomycin. The second factor of assistance in lowering the mortality rate was early diagnosis and earlier treatment. In that connexion Dr. Clarke discussed the differential diagnosis between pyloric stenosis, meconium ileus, obstruction from neuromuscular incoordination and intrinsic occlusions of the small intestine. With reference to types of occlusion of the large bowel and anus, he said that the abnormality was relatively common; it could be divided into (i) cases in which communications were present and (ii) cases in which communications were absent; it could be further subdivided into (a) cases of membranous obstruction or stricture, (b) cases of blind rectal pouch and absent anal canal, and (c) cases of blind rectal pouch and present anal canal. Type (a) was small in incidence but the most amenable to treatment. Type (c) was usually missed until signs of intestinal obstruction were well advanced, with poor prognosis. Type (b) constituted the majority of cases; if circumstances were suitable, operative treatment should be undertaken. Dr. Clarke referred to the help obtainable from radiology in diagnosis, and mentioned a number of points to be observed in the radiological investigation. He advocated that the pre-operative diagnosis should be "acute obstruction" rather than a more precise description of the condition; immediate action was most important. He said that the third factor in the lowering of the mortality rate was a clear knowledge on the part of the surgeon of what he might expect to find and of the appropriate specific surgical treatment. He stressed the importance of Sherren's dictum: "Anyone who opens the abdomen should be capable of dealing with any condition he may find there." Dr. Clarke, in conclusion, said that the day of complete evisceration of an unprepared patient in the search for a diagnosis, followed by some surgical procedure as an experiment, had gone.

R. SOUTHEY (Melbourne) said that as a physician he was deeply appreciative of the honour of being asked to open a discussion on a paper dealing with a surgical paediatric subject. Dr. Murray Clarke had just treated them to a concise and informative presentation of the subject of intestinal obstruction in infants and young children. He had emphasized with justice the necessity to have the patients treated early. In that respect Dr. Southey felt that it was their duty to impress upon those who had to care for the baby in the neonatal period that the condition was one of the absolute emergencies of paediatric practice. Team work was the keynote of success in that direction. In the first place the nurse in charge

of the young baby or toddler must realize the prime necessity of reporting immediately to the obstetrician or through him to the paediatrician any departure from the normal health of the baby, such as (a) vomiting, especially if repeated or persistent, (b) constipation or any change from normal regularity of bowel actions and (c) colicky pain in whatever manner it might be manifested. In particular Dr. Southby was of opinion that the vomitus or abnormal stool should be saved for inspection and accurate recording of its nature. Having a baby to examine in those circumstances, the physician should also make a careful and detailed study of the clinical history; that would often give him a clue to the diagnosis, which could be confirmed or disproved by the clinical examination, combined if necessary with special investigations. Dr. Southby then detailed three case histories to illustrate the importance of the procedure he had advocated. With special reference to meconium ileus, Dr. Southby said that he had always felt that a careful history and examination of the infant would indicate the possibility of the underlying condition, and that could be confirmed by radiological investigation, as the appearances on the films were characteristic. Having decided that the diagnosis was meconium ileus, the "consultant's prerogative" of making a rectal examination would often determine the issue, as it would be followed by a copious bowel discharge with relief of symptoms and disappearance of signs; thus the need for laparotomy would be avoided. It was important to remember that meconium ileus could be the precursor of cystic fibrosis of the pancreas, and Dr. Southby remembered that in one case a sufferer had later presented typical Hirschsprung's disease. Frequent repetition of rectal examination in a young baby could, as Dr. Clarke had noted, cause the baby to suffer from shock and be ill. Dr. Southby then said that volvulus in very young subjects and internal hernia fascinated him, as they could form the pathological basis of the so-called cyclic vomiting later in childhood. When some of those children were subjected to laparotomy, the mechanical cause had at times been found and relieved with complete freedom from the attacks afterwards. The conditions found had included volvulus, internal hernia, diaphragmatic hernia and congenital bands causing direct obstruction or giving rise secondarily to obstructed internal hernia. In conclusion Dr. Southby said that, if his remarks stimulated the earlier delivery of the subjects of bowel obstruction into the hands of the surgeon, he would have contributed something towards the saving of infant lives, and Dr. Clarke's faith in him as the opener of the discussion would not have been misplaced.

J. STEIGRAD (Sydney) said that he was always intrigued by the fact that variations and advancements in thought and practice in both medicine and surgery appeared to occur simultaneously and spontaneously in different centres. While he had not been aware that Dr. Clarke was to read a paper on the subject until a few days before the meeting, he could assure the audience that any physician or surgeon of the Royal Alexandra Hospital for Children in Sydney would join with him in congratulating Dr. Clarke on the paper and would echo his stimulating thoughts. He then said that experiences at the Royal Alexandra Hospital for Children in Sydney ran parallel with those expressed by the speaker, and the children's surgeons were nowadays beholden to the physicians and to the senior resident staff for reference of the tiny neonates to them in time for surgical interference to be undertaken, adequately assisted by satisfactory pre-operative and post-operative intravenous alimentation. While better recovery rates were being recorded in Sydney in the cases of extrinsic duodenal block and of large bowel occlusions of the imperforate anus type, the results in the cases of intrinsic block were not good. That was due mainly to the multiplicity of the lesions of atresia, and to the difficulty of the technique of anastomosis. In the condition of meconium ileus the results had been unsatisfactory in spite of the use of pancreatin. Dr. Steigrad said that he had been delighted to hear the speaker stress the importance of flat skiagrams of such babies, and in particular, the use of the method of Rice and Wangenstein, by which the skiagrams were made with the child in the "head down" position.

He also felt sure that the use of opaque media was not necessary for the diagnosis of the condition, and agreed that the administration even of a thin opaque medium into the stomach introduced the danger of inhalation and of pneumonia following upon vomiting.

Murray Clarke (Melbourne), in reply, said that there were no questions for him to answer, but he wished to express thanks for the reception accorded him. With reference to imperforate anus, he would like to add the comment that treatment was often disappointing, as the subjects developed megacolon due to mechanical block or neuro-muscular incoordination. The challenge he was issuing was in relation to the unsatisfactory death rate; the highest should be 1% or 2% and no more. Teams of physicians and surgeons should be formed to work together and to reduce those high mortality rates. In conclusion, Dr. Clarke said that the cases of pyloric stenosis and intussusception comprised the largest group, and by early diagnosis and early active measures prior to early surgical intervention great reduction of mortality could be achieved. The death rate from obstruction from old-standing intussusception or from old appendiceal scars with band formation was 43%, and the rate should be brought down to 5%.

SECTION OF PÆDIATRICS AND SECTION OF PATHOLOGY, BACTERIOLOGY, BIOCHEMISTRY AND EXPERIMENTAL MEDICINE.

Nutrition and Anæmia in Childhood; Congenital Steatorrhœa.

A COMBINED MEETING of the Section of Pediatrics and the Section of Pathology, Bacteriology, Biochemistry and Experimental Medicine was held to discuss nutrition and anæmia in childhood and also congenital steatorrhœa due to pancreatic defect.

J. H. COLEBATCH (Melbourne) read a paper on the subject of nutritional factors in relation to anæmia in childhood. He said that nutritional anæmia was still occurring with unnecessary frequency in infancy and early childhood. Its importance lay in the evidence that such anæmia increased the susceptibility of the child to infection. Nutritional factors necessary for the formation of the normal erythrocyte included certain vitamins, amino acids and minerals. Modern research had greatly widened the knowledge of those factors. The fat-soluble vitamins were not concerned with erythropoiesis, nor was thiamine. Ascorbic acid deficiency usually produced normocytic anæmia; but if an iron deficiency was present also, the anæmia might be microcytic. Ascorbic acid might act as a general marrow stimulant. Members of the vitamin B₁₂ complex played an undetermined part in preventing macrocytic anæmia; in particular, folic acid deficiency might cause megaloblastic anæmia in infants. Protein constituted the largest part of the erythrocyte and its hæmoglobin. It was essential for erythropoiesis, and a deficiency of the necessary amino acids might lead to anæmia. Protein deficiency was difficult to recognize. It almost certainly influenced the child's resistance to infection. Certain infant feedings were poor in protein, and therefore should not be used for long unless they were supplemented with protein hydrolysate. Animal protein was superior to vegetable protein, and meat protein, especially liver, appeared to be superior to the protein of dairy products. Iron was essential for the formation of hæmoglobin. Studies with radioactive isotopes of iron had fundamentally changed the knowledge of iron metabolism of which Dr. Colebatch gave a summary. He described the mechanisms by which iron deficiency might occur in infancy. He said that minor grades of iron deficiency were still common; they were difficult to detect without estimation of the hæmoglobin value. They predisposed the infant to infections; therefore the prevention of that type of anæmia was of considerable importance. A method of prophylaxis was suggested—the administration of medicinal iron from the age of two months until mixed feeding had been properly established for every infant whose feeding mixture was believed to contain an in-

adequate supply of iron. Dr. Colebatch went on to say that copper in very small amounts was required for the synthesis of haemoglobin, and its action was probably that of a catalyst. In most medicinal preparations enough copper was present as an impurity to obviate the need for prescribing copper separately. Nutritional anaemia was a preventable disease.

P. MACCALLUM (Melbourne), in opening the discussion, complimented Dr. Colebatch on having brought to light some interesting and important points in relation to diet and anaemia. He had been interested in Dr. Colebatch's remarks on the effect of folic acid on both the red and white series; he had thought for a long time that a factor common to both series was at work in a disease like pernicious anaemia. However, the importance of all the blood-building constituents must not be under-estimated in anaemia, and especially in relation to children, in whom a growing phase of the body made extraordinary demands on nutritional factors for both maintenance and expansion. It was important to be mindful of the demands made by the diseased body on constituents of the diet which should be relegated to haematopoiesis; it was furthermore important to recognize how detrimental was a blood deficiency in combination with a diseased state. Professor MacCallum commented on the timely practical application of the increasing knowledge of the important part played by protein on the body's metabolism.

A. R. EDMONDS (Perth) said that the commonly held definition that anaemia was a diminution in the amount of circulating haemoglobin should be modified. In anaemia the concomitant deficiencies in protein might have an important bearing on the body's inability to combat infection. Dr. Edmonds stressed the importance of a normal blood picture in the combating and prevention of infection.

D. GALBRAITH (Melbourne) supported the views of Dr. Colebatch on the importance of protein in the diet as a measure of enhancing recovery from disease. He said that his views were enhanced by observations made on long-stay patients at the orthopaedic section of the Children's Hospital at Frankston, Victoria. He suggested that proprietary baby foods and their low protein content might contribute to protein deficiency.

J. PERRY (Melbourne) remarked that credit was due to Dr. Colebatch for having found time to accumulate valuable material whilst in charge of a busy out-patient department. Dr. Perry said that the haematopoietic system was only one of the places where protein deficiency could manifest itself, and drew attention to the condition known as fatty disease of the liver, reported by Waterlow in children in the British West Indies. In those cases the accumulation of fat responded, not to the usual lipotropic substances, but to milk alone, which suggested that protein metabolism was concerned with that of fat in some other way than the supply of methionine and choline for the synthesis of phospholipids.

MARGARET HARPER (Sydney) presented a paper entitled "Congenital Steatorrhoea due to Defect of the Pancreas", which was read on her behalf by KATHLEEN WINNING (Sydney). It was first pointed out that confusion existed between the syndromes known respectively as idiopathic coeliac disease and congenital pancreatic steatorrhoea, and that the two should be completely separated. The paper presented was based on the pathological experience of 42 cases, and it would be shown that the disease could be diagnosed clinically from the neonatal period. Of the 42 babies, 22 were males and 20 females; 18 post-mortem examinations were performed. The condition was diagnosed clinically and the diagnosis was confirmed at autopsy in all the fatal cases. Five of the eight patients examined in the neonatal period died, the diagnosis being confirmed *post mortem*. The clinical indications which should arouse suspicion of congenital pancreatic steatorrhoea were then given in detail. With regard to the diagnosis, it was held that an adequate history of the child's progress from birth should be taken. A history of the stools should be carefully considered; it would often supply indications as to the correct diagnosis. The one indispensable condition in making the diagnosis was an examination of the stools, the findings being interpreted in the light of the clinical examination of the child. The

size, colour, consistency and odour, and the frequency with which they were passed, should all be noted. Diarrhoeal stools were seen only when the child had a digestive upset or an infection. With regard to the biochemical investigations, the following points were made: (i) In the examination of the stool for fat, it was generally enough to examine one specimen; it might be helpful to examine another at a later date. (ii) Examination of the duodenal contents for pancreatic enzymes did not appear in general to be helpful or necessary. (iii) Examination of the faeces for protein-splitting ferments did not appear to be reliable. (iv) Estimation of the amount of diastase in the urine was of value only in acute conditions. It was held that, if congenital pancreatic steatorrhoea was recognized as an entity, the symptoms of which occurred from birth, the diagnosis could be made clinically, often before the onset of the respiratory infection which usually terminated the patient's life. The condition was known to be familial. Other conditions in infancy and early childhood in which steatorrhoea occurred should be kept in mind. On pathological examination the pancreas might appear normal to the naked eye, or it might be thinner, firmer and more granular than normal. Rarely small transparent cysts of pinhead size might be seen. On microscopic examination, all degrees of dilatation and distortion of the acini and ducts were found. The lumina were filled with structureless material which suggested inspissated secretion. Interlobular and interacinar connective tissue was increased. The islet tissue was normal. In the series under discussion there had been no evidence of obstruction of the main ducts, such as occurred in congenital atresia or in malformation of the ducts such as might be found in the annular pancreas. The pathological findings in other organs were then described in some detail. The pathogenesis was said to remain obscure. Some indications as to treatment were given, although it was pointed out that in the present state of knowledge treatment could only delay the fatal outcome. Treatment was mainly dietetic. The children did not die from malnutrition, but from the effects of the chronic respiratory infection, treatment of which was unsuccessful.

J. H. COLEBATCH (Melbourne), in opening the discussion, said that cases of the disease under discussion were later in onset as observed in Melbourne, but attributed that fact to failure to take note of the previous history of children who failed to thrive and yet had a good appetite. He said that it was important to think of the disease in any child who showed failure to thrive, chronic respiratory infection or asthma. Chronic cough was the commonest presenting symptom. Helpful points in the diagnosis were the history, the presence of steatorrhoea, evidence of vitamin A deficiency, duodenal assay and X-ray examination of the chest. In treatment nutritional and anti-infective factors were most important. A diet rich in protein and vitamins and supplemented with pronutrin and pancreatin was essential. Prevention of anaemia and symptomatic treatment of respiratory tract infection were also important. Affected children lost 40% of their caloric intake in their stool. That fact stressed the need for a large intake.

J. PERRY (Melbourne) said that knowledge of the pathology of the condition was far from complete. He agreed with Dr. Harper's view that it was a systemic disease involving the alimentary tract and the respiratory system; but it was dangerous to regard the liver changes as a part of the original malady. The changes in the liver were akin to those seen in experimental animals after removal of the pancreas, and were almost certainly due to the metabolic changes incurred by a diseased pancreas. He suggested that the familial incidence of the disease could be related to the incidence of secretors of blood group specific substances. It was well known that the pancreas, lung and alimentary tract of patients who were secretors contained a large amount of group specific substance. It was possible that a mother of blood group O with a secretor child of blood group A might have developed a agglutinins of sufficiently high titre to be effective against the group specific substances in the organs of her secretor child. That conception would bear further investigation.

R. H. CRISP (Perth) drew attention to two cases in his practice, which demonstrated the familial incidence of the disease and the relationship of meconium ileus to fibrocystic disease of the pancreas. The two patients were siblings, showed failure to thrive and demonstrated the early incidence of the disease.

R. H. SOUTHEY (Melbourne) said that he agreed that the liver changes in the disease under discussion were secondary to the dietetic upset, which was the result of deficient pancreatic secretion. In those children it was possible, by adequate treatment, to delay and perhaps prevent the development of cirrhosis by suitable dietetic measures.

SECTION OF PATHOLOGY, BACTERIOLOGY, BIO-CHEMISTRY AND EXPERIMENTAL MEDICINE,
AND SECTION OF PUBLIC HEALTH, TUBERCULOSIS AND TROPICAL MEDICINE.

Symposium on B.C.G. Vaccine.

A COMBINED meeting was held of the Section of Pathology, Bacteriology, Biochemistry and Experimental Medicine, and the Section of Public Health, Tuberculosis and Tropical Medicine. The meeting took the form of a symposium on B.C.G. vaccine.

D. R. W. COWAN (Adelaide) read a paper on the clinical aspects of B.C.G. vaccination, in which he referred to the work of Heimbeck on tuberculous infection amongst nurses in Oslo, and to similar work carried out in Adelaide over a period of ten years. Dr. Cowan said that the work had shown that the chief incidence of tuberculosis was amongst the "Mantoux negative" nurses. Of 360 nurses who changed from the "Mantoux negative" to the "Mantoux positive" state during the course of their training, 95 (over 25%) showed clinical evidence of tuberculosis. Amongst the nurses who had started their training in the "Mantoux positive" state, virtually no tuberculosis occurred. In an effort to protect the "Mantoux negative" nurses against the effects of primary tuberculous infection, B.C.G. vaccination, carried out with vaccine prepared in Adelaide, had been in use over the preceding eighteen months. Included in the group also were "Mantoux negative" students and children in tuberculous families. In all, over 500 vaccinations had been carried out by the multiple puncture method. Except in two of the earlier groups, in which the vaccine used was too weak, there had been a regular conversion of the Mantoux response. None of the vaccinated subjects had come to any harm. The vaccination "takes" had not been excessive, and no ulceration, no obvious glandular enlargement and no constitutional disturbance had occurred. The Mantoux reactions following vaccination were definite, but only of moderate intensity with little induration and no vesication. They differed from the intense reactions with vesication following accidental infection with virulent tubercle bacilli. B.C.G. vaccination was offered as an addition to, not as an alternative to, recognized methods of tuberculosis control.

E. A. NORTH (Melbourne) read a paper on B.C.G. vaccine, based largely on his observations during a recent trip abroad. He said that there appeared to be little difference in the virulence of strains now used. However, there were six points in which variations were noted; they were (a) the methods of maintaining cultures, (b) the incubation period of Sauton cultures for the preparation of the vaccine, (c) adequacy of trituration, (d) accuracy of dispensing the vaccine, (e) consequent difference in quality, and (f) thoroughness of safety measures. Scandinavian practice appeared particularly sound, and was being followed in Australia. Dr. North laid down certain principles which he considered should be followed with regard to the use of B.C.G. vaccine. (i) Vaccine production should be non-competitive, a close liaison being maintained between the B.C.G. laboratory and the clinician. (ii) The cooperation of doctors and the public was neces-

sary for the success of an immunization project. (iii) Rigid standardization of the "screening" procedure of the vaccination technique, of "follow up" and of recording was necessary. (iv) Vaccination should be instituted only on the signed request of persons desiring it, after the facts concerning B.C.G. had been presented to them.

JOHN DALE (Melbourne) asked what was the result when B.C.G. vaccine was given to a Mantoux reactor.

E. A. NORTH (Melbourne) replied that he himself was a strong Mantoux reactor and had administered B.C.G. vaccine to himself. The result was less dramatic than he had expected, and his view coincided with that of other workers, that no harm came from the administration of B.C.G. vaccine to positive reactors.

R. M. DE LAMBERT (Sydney) emphasized that before any large-scale B.C.G. vaccination was instituted, a proper plan for the assessment of results should be formulated. He inquired of what value was the vaccine to positive Mantoux reactors.

A. PENINGTON (Melbourne) supported Dr. de Lambert's views on the necessity of a suitable plan, and expressed the hope that a freeze-dried vaccine of longer durability might in future take the place of the present vaccine.

A. R. BURKITT (Hollywood, Western Australia) asked if there was any difference between the morbidity of the disease in people who had become Mantoux positive as a result of natural infection and those who had been vaccinated. He asked for information concerning the use of the vole bacillus, which should be more practicable than the use of an attenuated virulent strain.

F. M. BURNET (Melbourne) supported the views of previous speakers concerning the need for a suitable plan for the use of B.C.G. vaccine to make possible adequate assessment of results. He said that it was necessary at that early stage to avoid propaganda, such as would result in a demand for universal use of the vaccine, which would muddy the field of investigation, and result in failure to assess results by having a large number of positive Mantoux reactors in the community. He was not in favour of indiscriminate use of the vaccine at the present time.

COTTER HARVEY (Sydney) said that reference had been made to a lack of plan by Dr. Burnet; but there was indeed a plan for the careful use of B.C.G. vaccine. It was undesirable to withhold the use of the vaccine in "certain risk" groups such as nurses and medical students. That the vaccine was a safe measure was generally agreed, and it was necessary to take a practical as well as a scientific viewpoint.

P. MACCALLUM (Melbourne) said that B.C.G. vaccination gave the patient a disease which subsequently modified the course of clinical tuberculosis. When a positive reactor was produced and remained a positive reactor, they had given the patient the disease they wanted him to have, and not the disease he would contract haphazardly.

D. R. W. COWAN (Adelaide) said that assessment of results was important, but in his view it might take twenty or thirty years. In the meantime it was their duty to combat tuberculosis with every measure available. B.C.G. vaccine was one of those measures, and its use must be instituted immediately among those subjected to particularly heavy risk.

Antibiotics.

A COMBINED meeting of the Section of Pathology, Bacteriology, Biochemistry and Experimental Medicine, and the Section of Public Health, Tuberculosis and Tropical Medicine, was held to discuss antibiotics.

JOHN FUNDER (Melbourne) discussed streptomycin, polymyxin and chloromycetin. With reference first to streptomycin, he said that its production by the fungus *Streptomyces griseus* had been reported by Waksman and his colleagues early in 1944. He gave a brief description of the method of commercial production of streptomycin, and discussed, in relation to its clinical use, its chemical

characteristics, its toxicity in man and the phenomenon of the development of streptomycin-resistant strains of bacteria. He referred to its therapeutic value in the treatment of *Hæmophilus influenzae* meningitis, of infections of the urinary tract with Gram-negative organisms, of pertussis, of wound infections, of undulant fever, of tularemia, of bacterial endocarditis, of pneumonia due to Friedländer's bacillus, of plague and of peritonitis. He said that streptomycin was a valuable chemotherapeutic agent, and that careful clinical judgement and laboratory supervision were often required to ensure that its full therapeutic potentialities were realized and that the hazards of streptomycin therapy did not outweigh the probable therapeutic effect. Turning to polymyxin, Dr. Funder first described the production of a variety of antibiotics by aerobic spore-bearing bacilli of the *Bacillus polymyxa* group. The results of trials of two of the antibiotics—polymyxin and aerosporin—in experimental infections of animals with Gram-negative organisms, and to a limited extent in human disease, suggested that further evidence was required to establish those antibiotics as useful chemotherapeutic agents. Investigations of antibiotics produced by other members of that group of bacteria were being continued, and there were indications that they might yield a useful non-toxic antibiotic. Dr. Funder then briefly reviewed the history of the discovery and development of chloromycetin. He drew attention to its powerful antibacterial action against a number of Gram-negative organisms (the typhoid and paratyphoid *B* bacilli, the Sonne dysentery bacillus, strains of the *Bacillus coli* and *Bacillus aerogenes* group, *Hæmophilus pertussis*, *Brucella abortus*, *Brucella melitensis*, *Brucella suis* and *Brucella tularensis*, Friedländer's bacillus and *Proteus vulgaris*), and to its proved anti-rikketsial activity in experimental chick-embryo and murine infections. In conclusion, Dr. Funder gave a brief account of a successful trial of chloromycetin in the treatment of scrub typhus in Malaya, during which no effects suggestive of toxicity of chloromycetin in the doses used were observed.

RUSSELL GODBY (Sydney) read a paper on the use of streptomycin in some forms of tuberculosis, in which he reviewed the treatment with streptomycin of patients at the chest clinic of the Repatriation General Hospital, Concord, New South Wales, from May, 1947, to July, 1948. He said that before streptomycin therapy was instituted, the diagnosis was proved bacteriologically in all cases except one. The present dosage for the patient with an acute exudative lesion was one gramme per day for sixty days, and for complications such as tuberculous laryngitis the patient was given a twenty-day course of one gramme per day. With these dosages no significant toxic reactions had been observed; but when higher dosages were used severe reactions occurred, and in three cases streptomycin therapy was suspended. The indications for streptomycin therapy were: (a) tuberculous meningitis, (b) miliary tuberculosis, (c) tuberculous laryngitis, (d) tuberculous cutaneous sinuses and (e) acute and subacute exudative pulmonary lesions. In the first (meningitis) group four patients had been treated; one patient was still living after four months, was symptom free except for enlarged lymph glands, and was progressing satisfactorily. The cerebrospinal fluid findings were normal, except for a raised protein level and a lowered sugar content. In the second (miliary tuberculosis) group, three out of the four patients were progressing satisfactorily, and the miliary distribution as revealed by X-ray examination had almost disappeared. In the third (tuberculous laryngitis) group, which consisted of 23 patients, early relief of symptoms was afforded and the laryngoscopic picture improved. In the fourth (tuberculous cutaneous sinuses) group, 12 patients with draining sinuses rapidly responded to streptomycin therapy. Streptomycin was not indicated for patients with tuberculous empyema. In the fifth (exudative pulmonary lesions) group, 20 patients had received streptomycin and no other form of active treatment. Ten of the patients gained in weight, and during treatment the amount of sputum was reduced in almost every instance. High temperatures fell within the first few weeks. The sputum of eight patients was free from acid-fast bacilli at the

end of the course. The erythrocyte sedimentation rate was not significantly affected until some time after streptomycin therapy ceased. X-ray examination revealed pronounced or slight retrogression of the lesions in 16 cases. Four more patients had some initial retrogression of their lesions, which was only temporary. In four cases the radiological picture did not change appreciably. Reference was then made to the clinical and radiological effects in 18 cases in which streptomycin treatment had been combined with pneumothorax or phrenic paralysis and pneumoperitoneum. Four patients in this group failed to gain in weight; the majority gained a stone or more. In every instance the daily average output of sputum was reduced. All but two patients had a normal temperature. Acid-fast bacilli had disappeared from the sputum of 11 patients, and the erythrocyte sedimentation rate of 16 had fallen. In 13 instances radiological examination showed that the lesions had retrogressed. Of 14 patients who had cavitation before treatment, in 10 the cavity closed after the institution of combined treatment. Another group consisted of 13 patients who had received treatment with streptomycin and thoracoplasty. All except three patients lost weight during the stages of the operation, which had not been fully regained. The amount of sputum and the temperature were reduced in all instances, and the erythrocyte sedimentation rate was normal in all cases except one. Acid-fast bacilli had disappeared from the sputum of nine patients. The X-ray films revealed retrogression of the lesion and closure of cavities in all cases except two, and in each of these a fresh lesion was seen to be developing in other parts of the lung. In retrospect it was considered that the institution of streptomycin treatment and the thoracoplasty were badly timed. The importance of the role played by streptomycin as an adjunct to other forms of treatment was stressed. The recommendation was made that a plan of treatment should be envisaged beforehand, and the resistance of the organism to the drug should be periodically estimated.

NANCY ATKINSON (Adelaide) read a paper on antibiotics in Australian plants and fungi. She said that members of the lower fungi, the flowering plants and the larger fungi had been investigated for antibacterial activity. Among the plants *Drosera peltata* and *Persoonia pinifolius* had been further studied and the antibiotic partly purified. The *Persoonia* antibiotic inhibited a wide range of bacteria, but appeared fairly toxic. Myrtaceous plants produced antibacterial oils, of which one at least affected *Mycobacterium phlei*. Of the higher fungi *Cortinarius rotundusporus* and *Psalliota xanthoderma* (an edible mushroom) were found to inhibit representative Gram-positive and Gram-negative bacteria and *Mycobacterium phlei*. Some purification of the *Cortinarius* antibiotic was achieved; its toxicity seemed low and its activity was little affected by serum. The *Psalliota* antibiotic was difficult to purify from the mushrooms, but might prove easier to purify from cultured mycelium. Crude extracts showed low toxicity, their activity was little affected by blood, and they inhibited *Mycobacterium tuberculosis* and a wide range of bacteria including strains relatively insensitive to penicillin and streptomycin; bacteria were not easily adapted to withstand the *Psalliota* antibiotic. The characteristics of the two fungal antibiotics mentioned suggested that they might prove to be chemotherapeutically active.

SECTION OF PUBLIC HEALTH, TUBERCULOSIS AND TROPICAL MEDICINE AND SECTION OF RADIOLOGY AND RADIOTHERAPY.

Radiology in Tuberculosis; Standardization of Radiological Equipment.

A COMBINED MEETING of the Section of Public Health, Tuberculosis and Tropical Medicine and the Section of Radiology and Radiotherapy was held to discuss radiology in tuberculosis and also the standardization of X-ray equipment.

COLIN MACDONALD (Melbourne) discussed the X-ray interpretation of pulmonary tuberculosis in childhood. He said that only a small percentage of infected children showed convincing X-ray evidence, particularly when the search was confined to a single postero-anterior or antero-posterior film. Any deductions from increased linear markings alone must be made with circumspection. Particularly when it was known that the child reacted to the Mantoux test, one could be tempted to assign to increased linear markings a pathological importance which they did not possess. It was not possible to define the exact normal limits of the hilar shadows at various ages, and so the diagnosis of tuberculous adenitis from films alone could not be made with the facility that the literature suggested; many enlarged and even caseous glands escaped X-ray detection. Calcification in the lung fields might not always mean infection with the *Mycobacterium tuberculosis*. A well-proven calcified focus in a child's lung was no great cause for jubilation. There was little that was radiographically characteristic of the tuberculous types of pulmonary consolidation; their appearances could be simulated by other causes of radio-opacity—inflammatory, neoplastic or obstructive. With regard to cavitation in a child's lung, one had to be certain that cavitation was actually present, because it could be simulated by other conditions. The X-ray appearances of hæmatogenous miliary tuberculosis could be imitated by other conditions, among which were the lung changes seen in fibrocystic disease of the pancreas. There was justification for retention of the term "epituberculosis", if it was restricted to a clinico-radiological syndrome that might be defined as a clinically benign and radiologically persisting extensive area of opacity in the lung in children infected with tuberculosis. There were grounds for believing that it was not always due to atelectasis. Few areas in the body required more careful attention to radiographic technique than the child's chest; no interpretation should be attempted unless the films satisfied the canons of first-class radiography. Interpretation, except of a most tentative nature, should not be made on wet films. The X-ray examination was incomplete if only a single postero-anterior or antero-posterior view was taken. Mass fluorography was of little use in the investigation of children aged under fourteen years. If only pulmonary tuberculosis was being sought, it was better first to determine the Volmer or Mantoux reactors and later take large films of them only. As in other branches of X-ray diagnosis, in the field of pulmonary tuberculosis rushed or cheap radiology almost invariably meant poor radiology.

R. M. DE LAMBERT (Sydney) discussed the radiological interpretation of pulmonary tuberculosis in the adult. He said that the correlation of information derived from many sources was necessary for the accurate diagnosis and satisfactory management of pulmonary tuberculosis. Radiology represented one important source of such information. An understanding of the way in which radiographic images were formed was essential if the applications and limitations of the method were to be appreciated and correct inferences drawn from the observations made. The basis for the formation of radiographic images was briefly described. Dr. de Lambert said that radiology did not provide a basis for bacteriological and histological diagnosis, and attempts to make such a diagnosis on radiological evidence might prejudice the method so far as those unfamiliar with its limitations were concerned and might result in many an erroneous diagnosis. The extent to which information was available in relation to the diagnosis and management of pulmonary tuberculosis in the adult as a result of radiological investigation was briefly surveyed and illustrated. Particular reference was made to the use of radiology in the observation of the progress of pulmonary tuberculosis. Dr. de Lambert considered that there was a lack of satisfactory correlation of pathological findings with radiographic appearances as far as pulmonary tuberculosis was concerned. Collaboration between pathologists and radiologists, post-mortem radiography and museums which correlated the information gained by both those measures were suggested as correctives. Revolutionary changes, as far as the applica-

tion of diagnostic radiology to the chest was concerned, would follow the technical advances currently in progress.

K. H. HALLAM (Melbourne) discussed pulmonary tuberculosis in the aged. He divided his subject into four sections, with the following headings: (i) the "possibles" (culled from microradiological films), (ii) the "probables" (culled from elderly people), (iii) the "positives" (culled from post-mortem examinations), and (iv) the proof (culled from pathological specimens). (i) The "possibles" were subjects who, on the appearances in the microfilms, could be suffering from pulmonary tuberculosis. Statistics from that source were alarming. It was well known that recrudescence could occur at apparently static foci when intercurrent diseases arose. (ii) The "probables" were elderly patients who in the normal course of radiological examination for any purpose were found to have in their lungs pathological changes consistent with tuberculous infection. They presented the main problem, because of the difficulty in establishing a diagnosis and in determining the infectivity and the course of the tuberculosis if present. The course (progressive or regressive) and the stabilization or resurgence of the disease depended on the virulence and number of the infecting organisms, on the native and acquired resistance and the hypersensitivity of the patient, and on the tissues in which the infection occurred. In dealing with tuberculosis in the elderly, the radiologist could reasonably talk in terms of resistance, hypersensitivity and tissues. The aged might possess native and acquired resistance to tuberculosis, but their general resistance was lowered by their sedentary habits and by the undermining effects of other diseases. In aged patients a chronic tuberculous infection might be stimulated, by the occurrence of some other serious disease, to progress to caseation and miliary spread—a reversion rather to the course of the disease in infants. The question of total resistance in the various age groups was important, because the higher the decade, the more people were infected, either clinically or non-clinically. It was reasonable to assume that most elderly people who died from tuberculosis died from the pulmonary form; also many aged people who died from other causes were found to have suffered from pulmonary tuberculosis. Many elderly patients who died from pulmonary tuberculosis alone had never had their chests radiologically examined. It was urgent that at least all elderly patients occupying hospital and other institutional beds and all elderly out-patients should have their chests radiologically examined. It was the horrible truth that the undiscovered aged sufferers from pulmonary tuberculosis were the main spreaders of the disease. With regard to the tissues, Dr. Hallam said that tuberculosis made headway in lungs distorted by fibrosis and emphysema. Latent infections bound up in fibrous nodules might be reawakened and spread in a debilitated patient with poor pulmonary resistance. All elderly people who contracted pulmonary diseases should be controlled by serial X-ray films of the chest, in case latent tuberculosis lighted up. Care had to be taken to avoid sources of error in diagnosis, which might be difficult. (iii) Discussing the "positives", Dr. Hallam gave a number of statistical records from public hospitals, showing the incidence of pulmonary tuberculosis found at autopsy among subjects who had died in the hospitals concerned. He said that the statistics in no way represented the proportion of elderly tuberculous patients in the hospitals; they merely pointed the accusing finger at a source of infection for those who attended to patients in public hospitals. That source of infection could be cheaply and effectively eliminated by appropriate radiological examination of chests. (iv) The proof was provided by actual pathological specimens. In conclusion Dr. Hallam urged the widespread use of X rays in eliminating a dangerous source of infection in the community and stressed the difficulty of interpreting X-ray films which revealed pathological changes in the lungs in elderly people.

ALAN KING (Perth) read a paper on the subject of tomography as an aid in the diagnosis and treatment of pulmonary tuberculosis. He said that tomography was particularly valuable in the study of diseases of the lungs.

Its use was advocated as a complementary method in certain instances. The value of tomography did not appear as yet to be realized in Australia. In the study of pulmonary tuberculosis the usefulness of tomography had been confirmed in four main categories: (i) Diagnosis and differential diagnosis. Tomography might be used as an aid to diagnosis—for example, in the classical case of a cavity at the extreme apex of the upper lobe obscured by the bony thorax. In differential diagnosis tomography might provide suggestive evidence to be correlated with other investigations. (ii) Type of disease. Tomography might solve the problem of the complex opacities seen in the ordinary film and demonstrate different types of disease at different levels. (iii) Anatomical localization. Tomography might give definite information when anatomical localization was otherwise impossible, and might have a bearing on the type of treatment recommended. (iv) Thoracoplasty and empyema. Tomography might solve the difficulty when it was otherwise impossible to obtain a view of the obscured lung.

C. E. EDDY (Melbourne) presented a paper entitled "Standardization of Apparatus as Affecting Radiological Interpretation", which was read for him, as he was unable to be present. He held that progress in the standardization of X-ray equipment, particularly with regard to chest radiography, would require first the cooperative efforts of practising radiologists, who must to a great extent discard preconceived ideas and determine anew the qualities of the ideal chest radiograph. The most satisfactory combination of tube voltage, film characteristics, film density and intensity of illumination must be determined. As a result of such work it would be possible to specify new factors for radiographic technique, and it would then be the responsibility of the manufacturer to design possibly simplified equipment, which would enable the technical factors that had been mentioned to be achieved and reproduced with accuracy under a variety of operating conditions. In all the necessary investigations the radiologists would need to have the assistance of well-equipped physical laboratories, staffed with personnel specially trained and keenly interested in the problems of diagnostic radiology. Those laboratories would then play a dual role, first in assisting the radiologists to arrive at the requirements of the ideal standard radiograph and then in assisting the manufacturer in specifying the physical factors, to satisfy which equipment should be designed.

K. H. HALLAM (Melbourne) said that tomography was one of the most revealing forms of radiography developed in the last twenty years, but he was constrained to refer to one feature of its use, and that was its cost. In Victoria he had been using one-centimetre shifts, which meant the use of ten to fourteen films, making the cost in time and material considerable. Consequently, in private practice the cost was a steady influence, as it was frequently impossible for the radiologist to recover the full costs of a tomographic examination from a patient. As one who had been using tomography for fourteen years, he was amazed at the quality of the films exhibited by Dr. King; in fact they were the best he had ever seen. In discussing Dr. Eddy's paper, Dr. Hallam said that Dr. Eddy was an intrinsically great man who was essentially modest, but he was sure that, in the words of George Bernard Shaw ("I purr when I am stroked, like any other lion"), Dr. Eddy would purr if it was possible to express adequately the admiration he evoked. The radiologists, he thought, should hitch their wagon to the star of Dr. Eddy, because he was one who would listen to them, absorb their ideas and reform those ideas in a physical mould, as exemplified by the paper to which they had listened that day.

ALAN PENINGTON (Victoria) said that an unexplained observation in America made in the interpretation of X-ray films of children had followed the use of B.C.G. vaccination. Theoretically, after such vaccination, the radiological appearance following a fresh infection from without should not be the appearance presented by the classical primary complex. It was, however, a fact—which on his recent visit to the United States of America Rosenthal and Levine had informed him they could not

explain—that the radiological appearances of the primary complex in both the vaccinated and the unvaccinated were identical.

H. K. FRY (Adelaide) said he had to protest at the opinion which had been expressed that mass radiography applied to children under the age of fifteen years was not worth while. In Adelaide such a survey covering 15,000 subjects had been made and he thought it important from the viewpoint of the public that it should be stressed that such surveys were not a search for morbid lesions but were "health surveys". Among the children examined in South Australia, 1.7% had shown abnormalities, but only one in 2000 had shown active tuberculosis. However, the survey revealed healed tuberculous lesions, chronic sinusitis and other deviations from the normal and the detection of healed lesions was of great help in the "follow-up" of family contacts. They had found that the propaganda value of such examinations was great, the children acting as propagandists with their parents. Another point on which Dr. Fry desired information was whether radiologists could help in the treatment of tuberculosis. If the natural history of the disease was studied, it was found that children in early life were very susceptible; later, in the period of latent sexuality, the disease was rare but in that period the positive Mantoux reactor rate rose. At puberty a marked sensitivity to tuberculosis arose and it continued in both men and women up to the age of forty-five years; over that age the rate in men was double that in women. Dr. Fry wondered whether there might not be some significant relation between active sexual life and susceptibility to tuberculosis, it being well known that both in adolescence, with its sexual activity, and in pregnancy, the disease was difficult to treat. If susceptibility to tuberculosis was related to gonadal activity, would it be reasonable in the early stages of the disease to diminish that gonadal activity by the use of radiology?

COTTER HARVEY (Sydney), speaking of epituberculosis, said that it was a radiological conception and that it might be due to consolidation, atelectasis or allergy. However, there were no post-mortem proof and no clinical basis for the conception and he wondered whether the radiologists could help by doing more than giving it a vague label. He regretted that radiologists were inclined to be dogmatic, and while the chest physicians were in a position to cross swords with them, the general practitioner was at times led astray by that dogmatism. He commented also on the stereotyped phraseology sometimes used in radiological reports which could be misleading, and regretted that few radiologists endured "the salutary lesson of the dead house". He also regretted that in general hospitals so many films were reported on by radiologists that they lost that personal touch with patients which obtained in sanatoria. In his experience tuberculosis was now a disease of young women and old men, and he thought it important in hospital practice that all patients, both indoor and outdoor, should be examined by X rays, as such a procedure would reveal many unsuspected cases of tuberculosis among those attending hospital for the treatment of other conditions. Conclusive evidence of the value of tomography had been given by Dr. King; Dr. Harvey considered that no radiological department dealing with chest diseases was functioning properly if it did not possess and use a tomograph.

L. HENZELL (Perth) said that all patients at the Perth Hospital were now examined by X rays, and a remarkably high incidence of active tuberculosis had been detected among elderly men, particularly among those attending the ophthalmological department, those with prostatic enlargement, and many of those with cardiac failure.

R. M. DE LAMBERT (Sydney) showed a series of 14 films illustrating three cases of pulmonary tuberculosis proved by bacteriological examination, and designed to show the variations of quality in films taken under varying conditions of exposure and kilovoltage, and with and without intensifying screens. He stressed the desirability of developing techniques which would produce standard films. He was of the opinion that the cost of tomography could

be reduced in many cases, because with good localization it was possible to obtain four tomographs on a twelve by ten inch film.

COLIN MACDONALD (Melbourne) showed a series of slides illustrating lung changes in fibrocystic disease of the pancreas and also discussed the radiological appearance of the thymus. Referring to Dr. Fry's argument in favour of mass radiography of young children, he said that in his experience it was difficult to obtain satisfactory micro-films from young children and he thought that unless the work was well done it was better not done at all. He still believed that the best procedure was to begin a

mass survey by Volmer patch testing, followed by radiological examination of the reactors. Rather than pay regard to indefinite findings, such as increased linear markings, and frightening parents with conclusions drawn from imperfect films, he preferred to rely on the findings of a good clinician using his stethoscope. In his experience the question of the radiological examination of the accessory sinuses in small children, especially those under the age of two years, presented great difficulty, and he viewed with terror the suggestion that all children attending the Children's Hospital, Melbourne, should be submitted to X-ray examination.

Section of Anaesthesia.¹

President: S. V. Marshall, M.B., Ch.M., D.A. (R.C.P. and S., England), New South Wales.

Vice-Presidents: A. D. Lamphree, M.B., B.S., M.R.C.P., D.A. (R.C.P. and S., England), South Australia; S. G. Gibson, M.C., E.D., M.B., B.S., Tasmania; D. G. Renton, M.B., B.S., D.A., F.I.C.A., Victoria; E. R. Beech, M.B., M.R.C.P., Western Australia.

Honorary Secretary: G. R. Troup, M.R.C.P., F.R.A.C.P., Western Australia.

President's Address.

S. V. MARSHALL (Sydney) took as the subject of his presidential address "Anaesthesia Today". He briefly outlined the development of anaesthesia during the past ten years, referring to its increasingly wide scope as a specialty. He said that modern anaesthesia in its wider applications demanded enthusiastic study, specialized training, adequate facilities and suitable reward. Although the greater proportion of anaesthetics were given by persons of average competence, the field of the specialist was rapidly expanding. Ordinarily competent persons should restrict themselves to the simple procedures. Both they and the surgeons should take advantage of expert services whenever they were indicated. While simplicity in technique was generally admirable, specialized methods were indispensable in many cases. The principle of synergistic anaesthesia, established by Gwathmey thirty years earlier, was being increasingly utilized. Although it was sometimes derided, the procedure was highly rational. The basis of good anaesthesia was extensive knowledge and careful observation of physiological principles. The intrinsic properties of the various agents were less important than the ability of the users. The introduction of more complicated yet useful methods increased the obligations and responsibilities of anaesthetists. Adequate ventilation, in its widest sense, should be the motto of all anaesthetists. Closed circuit inhalational anaesthesia, if properly conducted, would readily fulfil that ideal, especially in emergencies. Of the many innovations, the application of curare was a striking advance, which yet awaited final assessment. The position at the present time was one of continued inquiry and trial, which deserved all possible encouragement. Further improvement and progress were inevitable.

Cyclopropane.

MARY BURNELL (Adelaide) discussed the present position of cyclopropane. She said that the most important change in the general attitude to cyclopropane had been caused by the general introduction of curare. The effect of cyclopropane on blood pressure was slight in the absence of carbon dioxide retention. The effects on gastro-intestinal contraction, on the liver, on the fasting blood sugar content and on the general metabolism were slight. Uterine contractions were not abolished except in deep planes, and fetal respiratory movements were not inhibited. Cyclopropane was quickly eliminated unchanged, mostly from

the lungs. Cyclopropane should always be given by a carbon dioxide absorption technique. "Cyclopropane shock" might at the end of the operation follow unnoticed carbon dioxide accumulation due to respiratory depression; morphine increased that effect. "Dead space" should be eliminated from the breathing system and respiratory depression should be prevented. A perfect airway was essential, and endotracheal methods should always be used if curare was given. Adrenaline and pituitrin were contraindicated, and the barbiturates rather than morphine should be used for premedication. Secretions and parasympathetic reflexes might be depressed by atropine or scopolamine. The signs of anaesthesia followed the general pattern. Supplementary methods of relaxation were important. From the point of view of tissue metabolism it was the deep planes that were damaging. Respiration and the pulse rate and rhythm were the main guides. Discussing the indications for cyclopropane, Dr. Burnell said that cyclopropane was at present the most useful agent for all "bad risk" patients. Contraindications were the presence of risk of explosion and the use of adrenaline or pituitrin. Cyclopropane was not generally used in neurosurgery because of a tendency to capillary oozing. A number of conditions were mentioned in which cyclopropane anaesthesia was preferred. A warning was given against the use of cyclopropane anaesthesia for children without a special apparatus to eliminate excessive "dead space"; the closed method of administration interfered considerably with heat loss, and might in such conditions predispose the febrile child to anaesthetic convulsions. With regard to sequelae, Dr. Burnell said that when curare was used post-operative nausea and vomiting were greatly reduced and post-operative respiratory complications were considerably less. If the patient reacted well and recovered consciousness quickly, he should be given his first dose of morphine early.

R. H. ORTON (Melbourne) thanked Dr. Burnell for her most capable discussion of the literature of the subject. He said that since every paper presented to a congress could not consist of original work, it was important that careful and judicious summaries of the literature should be included in the programme. In the pre-curare era, the use of cyclopropane had kept the anaesthetist continually on the watch for signs of overdosage, such as cardiac irregularity or undue respiratory depression. Since the advent of curare, the anaesthetist had had rather to watch for the signs of unduly light anaesthesia, such as a rising pulse rate or blood pressure, or spasmodic contractions of the diaphragm. It was now possible to forget many of the warnings of the pre-curare period, since anaesthetists worked at lighter planes of anaesthesia which

¹ The meeting held by the Section of Anaesthesia with the Section of Surgery and the Section of Public Health, Tuberculosis and Tropical Medicine has been recorded.

were infinitely safer. Dr. Orton said that he was often called upon to administer cyclopropane to babies even twenty-four hours old, in whom the problem of "dead space" was of critical importance. To obviate it, Dr. Renton, of Melbourne, had designed a miniature circle absorber having a dead-space volume of only 28 millilitres. Dr. Orton had used this apparatus several times, even for "blue babies", and found it to allow of effective "controlled" respiration. It was therefore a definite technical advance, and an account of it would soon be published.

G. TROUP (Perth) did not agree with Dr. Burnell as to the necessity of tracheal intubation in every administration of cyclopropane with curare. A good pharyngeal airway, such as Guedel's, would usually ensure an adequate respiratory exchange. If the bag of the apparatus was not too forcefully inflated, there would be no tendency to inflate the patient's stomach. The interference necessary for tracheal intubation could thus be avoided. Manual "assistance" to the respiration, in the manner suggested by Dripps, paid real dividends in reducing post-anæsthetic shock. Dr. Troup agreed emphatically with Dr. Burnell as to the value of "weaning-off" from a high concentration of oxygen to one approximately atmospheric, at the conclusion of an administration of cyclopropane. He was of opinion that the capillary oozing characteristic of cyclopropane was further increased by the exhibition of curare and asked the reason why.

G. BROWN (Adelaide) commended cyclopropane in cases of Cæsarean section, because it enabled the anaesthetist to dispense with all premedication except the use of atropine. In gynaecological operations, such as Fothergill's, performed upon older patients, he found the post-operative condition to be better after cyclopropane than after any other agent. In Cæsarean section, he suggested the administration of morphine as soon as the umbilical cord had been severed, so as to obtain its anodyne effect as soon as possible after recovery from the anaesthetic.

R. PRATT (Perth) was asked to comment, but replied that he found but little scope for cyclopropane since he had adopted Knight's technique with nitrous oxide, thiopentone and curare.

S. HECKER (Brighton, South Australia) confirmed Dr. Brown's views of the value of cyclopropane for perineal surgery on the aged. Patients under that agent showed some tendency to movement when the operator began to work on the perineum instead of the vagina, but their post-operative condition was better than when any other was used. He himself preferred tracheal intubation in upper abdominal operations.

I. SCHALIT (Newcastle, New South Wales) agreed with Dr. Troup in not employing intubation as a routine measure in abdominal operations. He stressed the psychological value of premedication carried to the point of drowsiness and amnesia. He therefore found the use of bromethol a good preliminary to the administration of cyclopropane, although a laborious one. To obviate that defect, he suggested the alternative of premedication with "Nembutal" in a dose of three to four and a half grains, combined with morphine and atropine.

K. GODFREY (Perth) said that he did not himself use intubation as a routine in abdominal cases. He dealt with a great number of very old patients, up to eighty-seven years of age, for whom he favoured the combination of very low spinal analgesia with cyclopropane anaesthesia.

J. R. CORNISH (Adelaide) inquired the reason for a rise of blood pressure when "Tubocurarine" was used with cyclopropane. He cited a patient, not his own, in whom this combination of events had led to a stroke. He was required to anaesthetize another hypertensive patient for the same surgeon. He used cyclopropane, no volatile supplement being necessary. He was quite prepared to use "Tubocurarine", but the surgeon would not have it, being alarmed by his previous experience.

D. WILSON (Perth) concurred in the hazards of a further dose of curare for closure of the abdomen, and suggested in its place a small dose of thiopentone. If curare was

to be used at that stage, the dose should be small or apnoea might result.

N. GEORGEFF (Perth) asked whether cyclopropane sensitized the patient to the effects of morphine. He cited one patient who had received cyclopropane in the early morning and morphine in the evening, and who had vomited for three days. He asked the reason.

G. CUMPTON (Perth) preferred to use intubation in upper abdominal cases, such as gastrectomy or cholecystectomy. Heavy premedication was not to be feared unduly, since respiratory depression could always be combated by "assistance". He agreed with Dr. Burnell as to the danger of the use of pituitrin with cyclopropane, deaths having followed its use in Cæsarean section and other obstetrical procedures.

Mary Burnell (Adelaide), in reply, said that it was impossible to cover all aspects of cyclopropane in the available time. The question of intubation was debatable, but she had often noticed that the vocal cords, although relaxed by curare, were yet adducted, so that obstruction could easily occur. Further, regurgitation of bile was always possible in an upper abdominal operation, and the presence of a tracheal tube was a defence against its aspiration. Oozing from capillaries was rarely sufficient to worry the surgeon and was a small price to pay for the other advantages of cyclopropane. She agreed with Dr. Brown in liking light anaesthesia with cyclopropane for long gynaecological operations. With regard to premedication, she was less merciful than she had formerly been, and somewhat restricted premedication for the sake of a quick recovery, with return of the protective reflexes and of deep breathing. Premedication to euphoria, combined with psychological handling, was preferable to premedication to oblivion. She preferred hyoscine to atropine because of its amnesic effect. Citing the old saying that a few fleas were good for a dog because they prevented his brooding upon being a dog, she thought it well to prevent the patient from brooding upon being a patient. She was not fond of the combination of spinal analgesia with cyclopropane anaesthesia, preferring one or the other, and cyclopropane if the patient was ill. She had often asked nurses to observe the recovery of patients from cyclopropane and had found them to be awake to the existence of cyclopropane shock. They told her that it lasted for forty-five or sixty minutes and often responded to a small amount of carbon dioxide in oxygen—a shrewd observation, in view of its origin in carbon dioxide imbalance. In reply to Dr. Cornish's question about rising blood pressure with curare, Dr. Burnell said that surgeons were apt to be swayed unduly by a single chance occurrence. In reply to Dr. Wilson, she advocated ether instead of thiopentone for closure of the abdomen. Reverting to Dr. Cornish's case, she interpreted the possible course of events as a rise in blood pressure due to retention of carbon dioxide in the body, followed by over-ventilation of the lungs when the anaesthetic was withdrawn, the apapnic condition depressing the blood pressure and perhaps leading to a cerebral catastrophe.

The President, S. V. Marshall (Sydney), summing up, said that undue stress need not be placed upon the hazard of explosion during anaesthesia with cyclopropane, provided (a) no excess of oxygen was present in the mixture, (b) the circle was completely closed, (c) no pressure was exerted upon the bag during the actual diathermy, (d) the patient was not touched during the diathermy. He described attempts to estimate the percentage of cyclopropane by smelling the bag as "a new form of addiction". Like Dr. Burnell, he preferred ether to thiopentone for gaining relaxation during closure of the abdomen. He stressed Dr. Burnell's point about accumulation of heat in absorption systems in hot weather, especially when the patients were children. As premedication, he favoured reassurance, combined with three grains of "Nembutal", on the evening before operation, followed by relatively light premedication in the morning. With regard to Dr. Cornish's case, he suggested that a similar train of events could appear quite apart from the anaesthetic administration, as part of a spontaneous vascular catastrophe.

Teaching of Anæsthesia.

S. V. MARSHALL (Sydney) described the teaching of anæsthesia in New South Wales. He said that while the teaching exhibited many deficiencies, it had a reasonably sound basis and should be capable of great improvement in the future. He discussed the subject under three headings: (i) undergraduates, (ii) resident medical officers and (iii) post-graduates. With regard to (i) he said that during the last term of fourth year or early in the fifth year of the medical course at the University of Sydney, students received ten lectures with cinematographic films from the lecturer in anæsthesia. According to their allocation in successive groups to the four teaching hospitals, students administered six or more ether anæsthetics under the supervision of a tutor or tutors in anæsthesia appointed either by the university or by the various hospitals. Discussing (ii), Dr. Marshall said that as juniors, resident medical officers administered one or more "lists" of anæsthetics per week under supervision. In general each officer spent two or more periods of three months each in giving anæsthetics for the various surgical services. He used mostly ether, but was gradually introduced to other anæsthetic procedures. Senior resident medical officers carried larger responsibility and had more latitude; in general, after preliminary instruction and demonstration, they employed special methods freely. They also played a large part in the training of their juniors. A few hospitals employed resident anæsthetists. With reference to (iii), Dr. Marshall said that the Post-Graduate Committee in Medicine in the University of Sydney organized various courses in anæsthesia for graduates. In addition the various specialist anæsthetists gave demonstrations and instruction, covering two or three weeks, to visiting doctors, generally from country districts. Such arrangements were purely informal and not subject to any remuneration.

Dr. Marshall then read a communication from ARNOLD W. ROBERTSON (Brisbane), describing the teaching of anæsthesia in Queensland. Referring first to undergraduate students, Dr. Robertson said that they received six lectures in general anæsthesia in their fifth year, the subjects being (i) a brief historical outline, (ii) the physiology of respiration, (iii) "open" ether, (iv) ethyl chloride, (v) nitrous oxide, (vi) spinal anæsthesia, (vii) intravenous anæsthesia, (viii) curare and (ix) intratracheal techniques. They also received four lectures on local anæsthesia. Students were required to administer six anæsthetics under supervision before sitting for their final year examination. The anæsthesia used for that purpose was almost always "open" ether, and the administrations were not recorded in any way; no evidence of them was required by the university. In practice some students gave more than the required six administrations. The University of Queensland had one tutor in anæsthesia only. The part-time teaching staff at the Brisbane General Hospital took no part in the practical teaching of students, as their appointment was a hospital and not a university one. In practice considerable student teaching was done by the visiting staff. Dr. Robertson then referred to instruction during the period as resident medical officers. He said that most resident medical officers spent a period of eight weeks as "anæsthetic residents" and had a fair amount of experience (about 150 to 200 cases on an average). Their work was supervised by the two part-time visiting anæsthetists, one of whom was at the hospital for four afternoons in every week, and also by the two full-time anæsthetic registrars. At the end of their term resident medical officers should have a fair idea of the basic principles of the administration of ether by the "open" and intratracheal methods, of intravenous anæsthesia and of spinal techniques. The two anæsthetic registrars got vast experience; the yearly average of operations in the general operating theatre was 9000 cases, and in the ear, nose and throat and eye theatres, 2300 to 2500. The present holders of the positions were capable of using most techniques currently employed. Turning to post-graduate teaching, Dr. Robertson said that the University of Queensland had undertaken no courses of instruction in anæsthesia. He understood that the Brisbane General Hospital would allow "approved" persons to

attend and gain the necessary qualifying experience before proceeding to the diploma in anæsthesia of other universities; but so far as he knew, no one had yet availed himself of that facility.

A. L. BRIDGES WEBB (Melbourne) discussed the teaching of anæsthesia in Victoria, on the basis of his experience at the Royal Melbourne Hospital. He said that the last two and a half years had been important in the development of anæsthesia in Victoria; the number of anæsthetists in the city of Melbourne had increased from five or six to about 30, and modern methods of controlled respiration using cyclopropane and curare were well to the fore. Dr. Webb referred to the disadvantages attendant upon the haphazard methods of instruction that had obtained during the war years and until recently, and said that much had been done to overcome them since the appointment of a clinical supervisor at the Royal Melbourne Hospital about eighteen months earlier. Students were to receive at least the major part of their instruction from one anæsthetist, and the instruction was to a certain extent standardized. The regime in use was a sequence of standard premedication, ethyl chloride induction and "open" ether. The students, in groups, were allotted to one of the four honorary anæsthetists, and were given a short lecture on the methods of administration, the main signs of the various stages of anæsthesia and danger signs; they were advised what to read before the next attendance. The patient was then anæsthetized by the instructor. When the students had all attended twice as a group, they were given individual instruction and were allotted one to each operating session. During the individual instruction the elements of "open" ether anæsthesia were again expounded, but after that the instructor merely stood by, interfering as little as possible. Towards the end of his series of cases the student was shown how to visualize the larynx and told of the dangers and difficulties of "Pentothal" anæsthesia. But the only aim in the first short series was that the student should be able to administer ether with safety. At the Royal Melbourne Hospital three chief difficulties had been met with during the attempt to institute the system described: (i) irregular attendance of visiting anæsthetists, (ii) lack of sufficient cases suitable for "open" ether anæsthesia, (iii) apathy on the part of the students, and difficulty in persuading them that it was worth missing one of a series of 20 lectures in some other subject in order to be present at their allotted operating session. Some anæsthetists thought that anæsthesia should be left alone until the resident medical officer period; Dr. Webb pointed out that until a period of residency became compulsory after graduation, such a provision would be impracticable. The present system was at best a compromise, and real knowledge came during the resident period. At the Royal Melbourne Hospital, as each batch of resident medical officers came on, they were compelled to give anæsthetics under the supervision of a visiting anæsthetist or of a senior resident medical officer; that arrangement was only partly successful—wrong methods and ideas were passed on from year to year, and no official instruction in modern methods was given. With the establishment of a diploma in anæsthesia at the University of Melbourne, some provision would have to be made for both instruction and experience in more advanced methods for the graduate. At present the candidate simply went from hospital to hospital and watched trained anæsthetists at work. Dr. Webb emphasized the need, in a city in which a diploma was given, for some arrangement to provide continuity of clinical instruction and opportunity to put the knowledge into practice.

ALLAN LAMPHEE (Adelaide) discussed the teaching of anæsthesia in South Australia. He said that an important question was what to teach the student and what to leave him to learn for himself during his resident days. At the University of Adelaide six lectures were allowed for the subject of anæsthetics, the number having remained unaltered for over twenty years. Dr. Lamphee would not say whether he considered that the number should be increased or not; but he pointed out that modern students had too many lectures to attend, and in any case the art of administering anæsthetics could not be learnt by read-

ing, but only by actual practice. He thought that the following points should be stressed: (i) the preliminary examination of the patient, (ii) the signs of the various stages of anaesthesia, (iii) the complications of anaesthesia and their treatment, (iv) premedication for the various types of anaesthesia and the reason for it, (v) immediate post-operative treatment, including oxygen therapy, and (vi) the choice of anaesthetic. All those points could be dealt with while the lecturer was discussing ether given by the various methods, spinal anaesthesia, intravenous anaesthesia and the various gaseous anaesthetics. Dr. Lamphee went on to say that ether was still the best and safest general purpose anaesthetic agent, and fortunately it was also still the best anaesthetic agent for teaching purposes, for three reasons: (i) it was safe, (ii) the various stages of anaesthesia were easy to define, (iii) the student could be taught the value of listening to the breathing and correcting any obstruction to the airway. Dr. Lamphee was convinced that a student who concentrated on giving ether by the "open" method had learnt more about the art of administering anaesthetics than one who had "had a shot" at most methods. The fundamental principles so learnt could be applied intelligently to intravenous and gaseous anaesthetics. Dr. Lamphee then referred to the conditions in Adelaide governing instruction in anaesthesia twenty years earlier, and pointed out how they differed from present-day conditions. At the present time operations in "bad risk" cases were naturally performed on the routine operating days; thus the teacher in anaesthetics had to give most of his instruction on the difficult, long operations for which in many cases a more specialized type of anaesthesia was used. It was impossible to give the intensive training in the "open" administration of ether which had been given twenty years earlier, and which was of such value to the student. Thus, so that the student could be "signed up" for the necessary 20 anaesthetics before graduation, the instructor was obliged to include a proportion of administrations from which he felt that the student had not been able to learn much. That was particularly so, in view of the enormous increase in the number of students. The position was not helped by the fact that, later, as resident medical officers, those same students would not be receiving the same concentrated experience in the administration of anaesthetics as the previous generation of residents did. Anaesthetists must be on guard lest in the teaching of anaesthetics they neglected a thorough training in the administration of ether, from which alone the fundamental principles of anaesthesia could be properly learnt. Lectures given should be elementary, and stress should be laid on principles rather than on technical details. More use should be made of selected cinematographic films. For actual teaching in the operating theatre in hospitals where the honorary system prevailed, in addition to the honorary anaesthetists, it would be advisable to appoint an adequately paid, full-time instructor.

G. KAYE (Melbourne) confined his remarks wholly to the academic side of undergraduate teaching, a side necessarily subordinate to the practical, which had been amply covered by the previous speakers. He believed that the purpose of academic teaching was to implant the basic facts of applied physiology and to ensure that the student "talked the same language" as his clinical instructor. That could perhaps be met by the following course of lectures: (i) respiration, (ii) pharmacology of the anaesthetic agents, with special reference to the signs of anaesthesia, (iii) assessment and pre-operative care of the patient, (iv) ether, the one agent of which the administration needed to be fully described, (v) emergencies of anaesthesia, (vi) undesirable sequelae of anaesthesia, and (vii) a session devoted to film strips of an amusing but cautionary nature. Unlike Dr. Lamphee, Dr. Kaye was opposed to teaching by cinematographic films, which required prior knowledge in the observer; the film strip was preferable for elementary training.

Dr. Kaye described the results of a questionnaire circulated recently to fifth-year students in the University of Melbourne. The main requests of the students were for: (a) formal lectures, accompanied by distribution of a multigraphed summary of each; (b) good lighting, to

facilitate supplementary note-taking; (c) free use of visual methods of presentation, with abundance of operation charts, diagrams and photographs; (d) preservation of an element of surprise and expectancy in the visual presentation; (e) varied, unhurried and humorous delivery; (f) abundance of cautionary tales and clinical instances; (g) limitation of the length of lectures to fifty minutes a piece; (h) demonstrations of apparatus mentioned in the course (for which purpose the existence in the university of the museum of the Australian Society of Anaesthetists was fortunate). Only a minority of students asked for lectures on the more spectacular methods of anaesthesia; most accepted the present course which Dr. Kaye had described as being well suited to their immediate needs. Dr. Kaye believed that lectures should be optional; knowledge gained under duress was not well retained.

R. H. ORTON (Melbourne) said that the anaesthetists of Sydney might well be proud of their organization for post-graduate teaching, to which Dr. Marshall had contributed so greatly. It was by far the best scheme in any State. The difficulty with undergraduate teaching in Australia was the vastness of the country and the varied destiny of students after graduation. Some went directly to remote districts where specialist surgery or anaesthesia did not exist; they should therefore master spinal and intravenous methods before they went. Others would remain in urban practice, but without interest in anaesthesia. Yet others would seek post-graduate training in that branch of medicine. The methods of teaching must therefore be of the nature of a compromise. Dr. Orton therefore advocated the teaching of ether administration, of intravenous methods and of spinal analgesia to students, and the reservation of the more technical methods to resident medical officers. Dr. Orton thought that Dr. Webb, from his experience of a military hospital staffed by graduates from all over Australia, would probably concur in his dictum that the Sydney graduates were the best trained in anaesthesia, the Western Australians next, and the Victorians perhaps the worst of all.

MARY BURNELL (Adelaide) agreed wholeheartedly with Dr. Orton. She said that on her visit to Sydney she had been shown around very thoroughly by the local anaesthetists. Of all that she had seen, the most impressive aspects were the keenness and eagerness to learn of the resident medical officers and the excellent organization which existed for their training. The junior resident anaesthetists were well supervised by their seniors, and they in turn by the honorary anaesthetists. The last-mentioned moved freely from theatre to theatre, supervising and giving advice or assistance. In other States the honorary anaesthetist was himself an administrator of anaesthetics, who was given all too little opportunity to direct his juniors. The arrangement of students into a group with a single instructor was most desirable; it stimulated interest, gave uniformity of teaching and avoided overlapping. It was well, in teaching, to make supervision as inconspicuous as possible, and to leave to the student as much responsibility as was reasonable, the patient's safety and the surgeon's convenience being borne in mind.

GILBERT TROUP (Perth) congratulated the speakers upon their earnestness in teaching and their clarity in expressing their views. He said that the difficulty lay in the fact that teaching usually stopped at graduation; nothing effective was done to bring it to the general practitioner, who particularly needed guidance not only in the methods which he should use, but in those which he should not attempt. As a Western Australian, Dr. Troup considered the recent graduates who had arrived in his State to be very well grounded in the principles of anaesthesia, although naturally their practical knowledge was limited. The directorship of anaesthesia at the Perth Hospital, which it was his chequered privilege to hold, had certainly aided in improving local teaching and equipment. Dr. Troup paid tribute to his team of honorary anaesthetists, all of whom had to gain a living from private practice and who had to make great financial sacrifices to fulfil their honorary commitments. All attended a morning and an afternoon session weekly, the morning session consisting

of orthopaedic, gynaecological and similar cases well suited to the training of resident medical officers. Those officers received instruction in ether given by "open" and endotracheal methods, in intravenous anaesthesia and in spinal analgesia. Registrars were taught to administer the gases, but never, even in the case of seniors, with curare. After twelve months' tenure of the directorship Dr. Troup found that it could not function well in the absence of at least one full-time, salaried, fully qualified anaesthetist, as at Newcastle Hospital. Such an appointment must inevitably come in time.

S. V. Marshall (Sydney) commented upon the unreason of expecting Dr. Troup to exercise the directorship at Perth in a purely honorary capacity. The fact that there was no medical school in Perth did not mean that no teaching went on there. In fact there was much teaching, and good, for which Dr. Troup was mainly responsible. For that reason he should have been one of the official speakers in the present discussion.

N. GEORGEFF (Perth) said that insufficient attention had been devoted in the discussion to post-graduate teaching. Trainee anaesthetists could not be had by waiting for them to come forward; one must go out and encourage them to come in. A special effort should be made to reach uniformity in the post-graduate teaching of anaesthesia in all the States of the Commonwealth.

I. SCHALIT (Newcastle, New South Wales) asked for details of the practical course given in Sydney for candidates for the diploma in anaesthesia.

S. V. Marshall (Sydney) replied that practical post-graduate teaching was impossible in the hospitals because of the great number of students, who had to receive priority. The diploma candidate could attend lectures, watch senior anaesthetists at work, and then go home and try to practise what he had seen. Evidence of a thousand administrations was expected of him when he presented himself for examination, and he might be asked to carry out upon a patient a required procedure during the examination; yet his formal practical instruction had been absolutely nil. There had been hopes and promises that Prince Henry's Hospital would become available as a post-graduate training ground, but nothing had eventuated as yet.

A. L. BRIDGES WEBB (Melbourne), in reply, said that post-graduate teaching in Melbourne was in a complete state of flux. The Royal Melbourne Hospital had one full-time anaesthetist at present; not until it had a department of anaesthesia would it be able to offer facilities for practical instruction of graduates. That step was in contemplation, but not yet implemented. Dr. Webb could well understand the difficulties outlined by Dr. Marshall; one Tasmanian graduate of his acquaintance had spent six months in the diploma course in Sydney without opportunity to administer an anaesthetic on a single occasion.

ALLAN LAMPHEE (Adelaide), in reply, said that it was the rare, keen pupil who went out of his way to obtain tuition. The resident medical officers in Adelaide seemed to be built differently from those in Sydney. Far from seeking opportunity to give anaesthetics, they evaded it whenever they could, throwing an extra burden upon the honorary staff. Dr. Lamphee wondered whether the blame for that condition of affairs lay with the resident medical officers or with their instructors.

S. V. Marshall (Sydney), from the chair, expressed thanks for the many complimentary references to Sydney. He was happy to think that everyone had agreed upon either as the primary agent for undergraduate teaching. It was well for the student clearly to realize his own limitations and to know when to seek specialist aid. Dr. Marshall said that in his own teaching he had a watchword, "Watch your A B C!", the letters standing for airway, breathing and colour. Dr. Lamphee's complaint of indiscipline amongst resident medical officers could be best met by punctuality in attendance, and in hour of attendance, on the part of the honorary staff. With regard to resident anaesthetists, Dr. Marshall thought that the man on a month's appointment was useless; his tenure should be a

year, and in Sydney it was hoped to make it three years. The appointee could then rank third in seniority to the superintendent and deputy superintendent, with authority over all anaesthetic registrars or junior resident medical officers employed in anaesthetic postings. A man of that calibre and experience would know when and when not to consult with the honorary staff, whose burden would be correspondingly eased. It was well if honorary anaesthetists could do their private work in the mornings and keep their afternoons sacrosanct for work in public hospitals. Dr. Marshall expressed his agreement with Dr. Kaye's ideas upon visual education. He agreed with Dr. Georgeff that neither instructors nor material for the clinical teaching of graduates could be lifted down from the empty air; it would probably take twenty-five years before post-graduate hospitals were functioning in Australia. In conclusion, Dr. Marshall drew a sharp distinction between the "anaesthetic resident" or "anaesthetic registrar" on a short-term appointment and the "resident anaesthetist". The last-mentioned should be appointed for three years if possible. At the end of that time he should prove to be a trained and versatile anaesthetist of much experience, well qualified to proceed to a diploma in anaesthesia and to specialization.

The Respiratory Valve.

GEOFFREY KAYE (Melbourne) read a paper on the respiratory valve, which he described as a structural component of an increasing percentage of appliances for anaesthesia. The paper was an account of a problem confronting the Committee on Standards of the Australian Society of Anaesthetists. Dr. Kaye said that the valves usually found in anaesthetic apparatus belonged to one of five types—(a) knife-edged, (b) spring-loaded, (c) caged-disk, (d) rubber sleeve, and (e) rubber flap—and he described each type in detail, mentioning any faults and any points to be observed in its operation. The design of a valve was said to be of cardinal importance. A restricted expiratory valve added to the muscular effort of respiration, with resulting unquiet breathing, imperfect relaxation of the abdominal muscles and eventual fatigue of the respiratory centre. The effects produced by a restricted inspiratory valve were still more promptly and decisively harmful; inspiration was achieved only at the cost of excessive activity of the diaphragm, of the intercostal muscles, and in extreme cases of the accessory muscles of respiration, and if the condition persisted both the respiration and the circulation would soon be embarrassed. The valves should be of good design and workmanship and should be maintained in good working order. The study of the design of valves and of the defects encountered in commercial samples of them was of practical utility to the anaesthetist; it also offered them a useful exercise in the applied physiology of respiration. Furthermore, precise standards for the design of valves had yet to be formulated. Dr. Kaye considered his subject in four categories: (i) general principles of design, (ii) standard types of valves, (iii) criteria for the design of valves, and (iv) the problem of the lifting valve. All these he discussed in detail.

R. PRATT (Perth) asked two questions: (i) whether a gap of an eighth of an inch between spring and disk of a knife-edged valve would lead to incompetency during inhalation, and (b) why the expiratory valve assembly of the Oxford vaporizer was unsatisfactory.

Geoffrey Kaye (Melbourne), in reply to the first question, said that the spring somewhat limited the "lift" of the disk, so that the aspirating effect of inhalation would then suffice to return the disk to the seating at the beginning of exhalation. It would not do so, however, should the gap exceed the prescribed eighth of an inch. In reply to the second question, he said that the valve assembly of the Oxford vaporizer was unworthy of the rest of the apparatus. It had almost every possible defect in bore, limitation of orifice, thickness of flap, smallness of vents and restriction of lift. The vaporizer itself was a good one and worked well if equipped with an expiratory valve of wide bore.

R. H. ORTON (Melbourne) said that he had participated in the calculations embodied in Dr. Kaye's paper and would like to add one point to them. The theoretical resistance offered by a knife-edged valve was equivalent to two millimetres of water per gramme weight of disk. In the case of a caged-disk valve it was one millimetre of water per gramme weight of disk.

I. SCHALIT (Newcastle, New South Wales) said that, since anaesthetists should always listen for the closure of their valves, the latter should have metallic disks capable of producing an audible impact. That statement was, of course, made subject to the proviso that metallic disks could be made which were not heavy and prone to adhesion.

D. WILSON (Perth) said that the white rubber obtained from the valves of American civilian respirators stood up well to use and to the effects of ether vapour. It would last for two years without needing to be renewed.

S. V. Marshall (Sydney) commented on the frequency with which the valves on the McKesson absorber warped and became incompetent.

Geoffrey Kaye (Melbourne) said that warping depended upon the heat treatment given to a plastic valve disk during its construction. He produced an example of an English plastic slide-rule, badly warped in the longitudinal plane owing to defective heat treatment when the scales were united to the body of the rule. A linen "Bakelite", which was flat and remained so, was made in Australia and answered very well for valve disks.

S. V. Marshall (Sydney) said that a sample of the linen "Bakelite" had been obtained by him from Dr. Kaye and had made satisfactory disks for his McKesson circle absorber.

Dr. Marshall, as President of the Section of Anaesthesia, then announced that the programme of the section had been completed. He said that it had been a stimulating programme, and he congratulated all the speakers who had contributed to it. Its one defect was that no arrangements had been made for the inclusion of anaesthetists from New Zealand, and it was to be hoped that that would be done at all future sessions.

(To be continued.)

Corrigendum.

In the issue of the journal for September 4, 1948, at page 280, under the heading "Nominations and Elections", an erroneous statement was made that eight medical practitioners, whose names were listed, had applied for election as members of the South Australian Branch of the British Medical Association. The correct statement is that the registration of these eight medical practitioners was approved by the Medical Board of South Australia on August 3, 1948.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Barnes, Lesley Helen, provisional registration, 1948 (Univ. Sydney), Sydney Hospital, Macquarie Street, Sydney.

Davidson, George Madgwick, provisional registration, 1948 (Univ. Sydney), Sydney Hospital, Macquarie Street, Sydney.

O'Shea, Desmond Patrick, M.B., 1945 (Univ. Sydney), 5, "Athens", 4, Penkivil Street, Bondi.

Obituary.

IAN THOMAS CAMERON.

WE regret to announce the death of Dr. Ian Thomas Cameron, which occurred on September 7, 1948, at Melbourne.

NORMAN EDWARD GIBBS.

WE regret to announce the death of Dr. Norman Edward Gibbs, which occurred on September 9, 1948, at Melbourne.

Diary for the Month.

SEPT. 28.—New South Wales Branch, B.M.A.: Ethics Committee.

SEPT. 30.—New South Wales Branch, B.M.A.: Branch Meeting.

OCT. 1.—New South Wales Branch, B.M.A.: Annual (1948) Meeting of Delegates.

OCT. 1.—Queensland Branch, B.M.A.: Branch Meeting.

OCT. 5.—New South Wales Branch, B.M.A.: Council Quarterly.

OCT. 6.—Victorian Branch, B.M.A.: Branch Meeting.

OCT. 6.—Western Australian Branch, B.M.A.: Council Meeting.

OCT. 7.—South Australian Branch, B.M.A.: Council Meeting.

OCT. 8.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmalm United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute; Brisbane City Council (Medical Officer of Health). Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

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